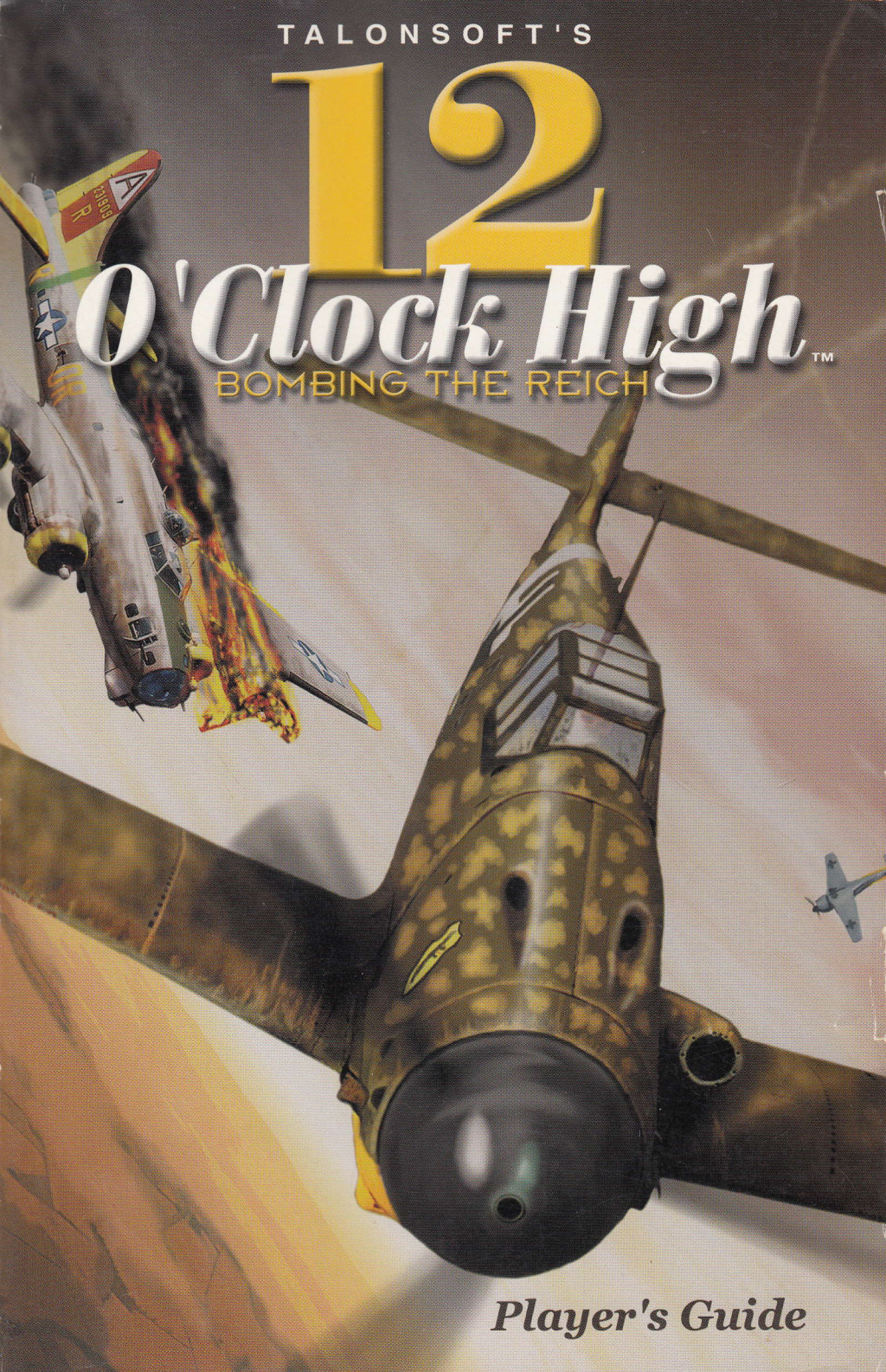
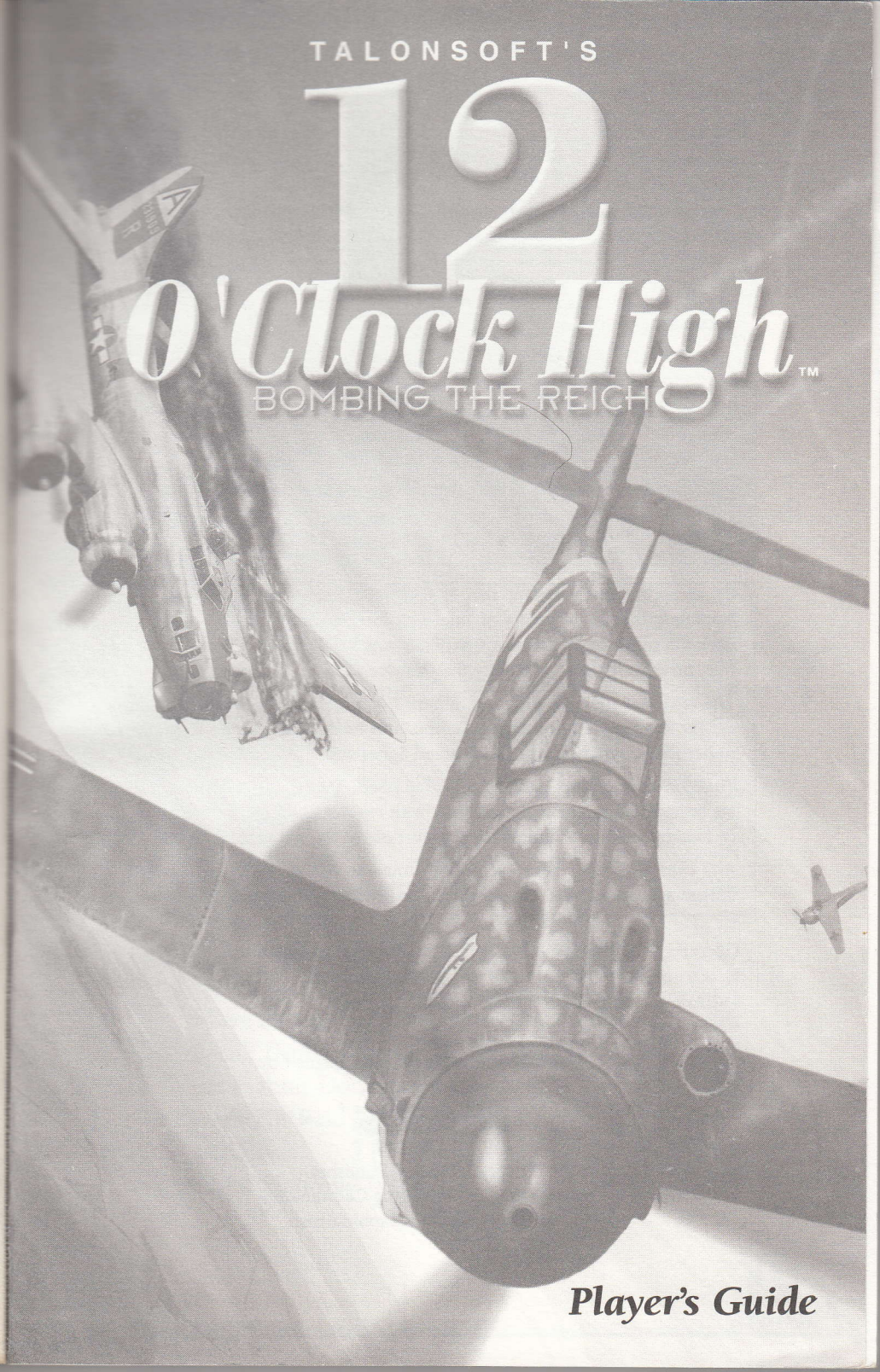
TALONSOFT'S

12 O'Clock High™

BOMBING THE REICH



Player's Guide


TALONSOFT'S
12
O'Clock High™
BOMBING THE REICH
Player's Guide

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TALONSOFT'S 12 O'CLOCK High BOMBING THE REICH

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I. INTRODUCTION

The Battle of Britain had been won, "their finest hour" had come and gone, and the tide of war was changing. No longer was it the British alone against Germany; now, it was truly a World War, as the United States and all the far-flung British Empire joined in the fray. So did air forces that had managed to escape Hitler's advance: as in the Battle of Britain, some of the most vengeful air squadrons were those composed of Polish, Czech, or Free French pilots.

The time had come to carry the war back to the Reich, and the primary weapon was air power. In ***TalonSoft's 12 O'Clock High: Bombing the Reich***, you can relive this great air war. As commander of the Allied forces, you have all the resources of the combined Allied countries at your command. Alternatively, you can elect to play as the German commander—and possibly change history!

A number of different scenarios are available to you, regardless of which side you choose. They run from the summer of 1943 through D-day and beyond—indeed, to the dawn of the jet age near the end of the war in Europe. While most campaigns run over many days or even weeks (at a play rate of one "turn" per day), we've also included a one-day campaign that's an ideal way to be introduced to ***12 O'Clock High: Bombing the Reich***.

This Player's Guide explains in detail all the features and functions of the game. Read it carefully. Read Chapter II (Getting Started) first, to learn how to plot Allied raids against Hitler's "Festung Europa" ("Fortress Europe"). And while they may seem peripheral to actual gameplay, read the historical sections near the end of this guide; they'll not only show you ways of playing far more effectively and enjoyably, but they'll move your appreciation and understanding of this crucial time in history to a whole new level.



NOTE TO *BATTLE OF BRITAIN* PLAYERS

If you're a veteran *Battle of Britain* player, *12 O'Clock: Bombing the Reich* will be very familiar to you. You should be able to jump right in and begin play. However, we recommend that you spend some time leafing through the manual to find the new features/functions particular to this game. You'll also want to review the scoring section of the guide (see p.89) as there are a number of changes there. And finally, you'll want to look through the target descriptions (see p.105) because this game includes several new target types.

PLAYER'S GUIDE LANGUAGE AND FORMAT

For simplicity, the pronoun "he" is used where appropriate. The words "raid" and "mission" are interchangeable. The words "unit" and "air unit" are interchangeable. The words "primary airfield" and "airfields" are interchangeable. The word "squadron" is used to represent both Allied units and German Luftwaffe gruppes. The words "scenario" and "campaign" are interchangeable. And finally, items underlined in the guide (e.g., "Select Bomber Missions") represent steps that the player should take to complete certain tasks. Other text accompanying the underlined steps is for informational purposes and should be read to ensure full understanding of all game functions.

II. GETTING STARTED

TalonSoft's 12 O'Clock High: Bombing the Reich is a game that requires some study to learn well. However, the actual mechanics of clicking buttons, plotting Allied raids, launching Axis interceptors, etc., is really quite simple. This section of the Player's Guide will help you get started quickly, by describing how to plot a few Allied raids and start the Reaction Phase. It is recommended that you begin your play of ***Bombing the Reich*** as the Allies, as we believe it's easier to get into the game this way; once you've plotted your raids, you can sit back and watch them fly.

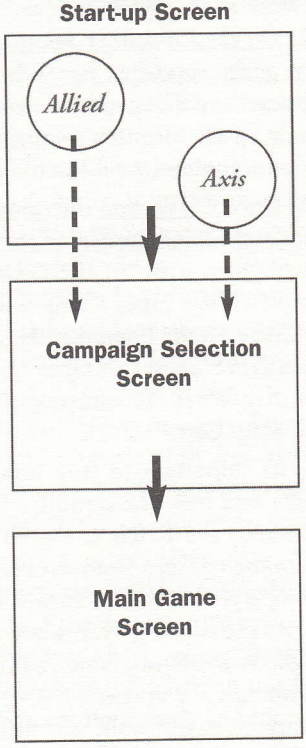
Screen Flow Chart

Here's a quick diagram of how the screens in ***Bombing the Reich*** relate to each other. Basically, beginning a new campaign begins by selecting either "New Allied Campaign" or "New Axis Campaign" from the Start-up Screen, then on to the Campaign Selection Screen, and then on to the Main Game Screen where the game is played. Other screens can be accessed from these three main screens, but you shouldn't concern yourself with those until you become more familiar with the game. If this is the first time you're playing ***Bombing the Reich***, we'd suggest you try the one-day 1943 campaign (bombing Germany's ball-bearings factories) which appears first on the list of available choices.

The Multiplayer, Game Options and Saved Games Screens can also be accessed from the Start-up Screen. Selecting "New Allied Campaign" or "New Axis Campaign" takes you to the Campaign Selection Screen.

On the Campaign Selection Screen, you will choose which campaign to play. Click the game map in the bottom right-hand corner when a campaign is selected. This takes you to the Loading Screen, then the Main Game Screen.

Bombing the Reich is played on the Main Game Screen. The Game Options and Saved Games Screens can also be accessed from the Main Game Screen.



ITAIN PLAYERS
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III. Tutorial Introductory Scenario: Attack on Schweinfurt

Follow the steps below to play the one day (or one turn) 1943 "Introductory" scenario as the Allies. This scenario roughly simulates the Allied bombing attack against the Schweinfurt area. In this tutorial, we will walk you through the steps in choosing a campaign and plotting bombing raids against the ball bearings factories of Kugelfischer, and Vereinigte #1 and #2.

(1) *Select "New Allied Campaign" in the upper left hand corner of the Start-up Screen.* This takes you to the Campaign Selection Screen where you will choose your campaign.

(2) *On the Campaign Selection Screen select "Introductory 10/43" at the top of the campaign list.* When you do this, the campaign's description appears and the map in the bottom right-hand corner highlights. Read the campaign description carefully. To win this campaign, you must score 10 or more points. We'll discuss how to score points later in this tutorial.

(3) *Once you've read the campaign description, select the map in the bottom right-hand corner of the Campaign Selection Screen.* It should be highlighted with "START GAME." The Loading Screen appears. Don't be surprised if it takes a long time for the campaign to load! ***TalonSoft's 12 O'Clock High: Bombing the Reich*** is a very complex game with large internal databases. It takes time for all the internal data to be organized for play. When the campaign is finished loading, you are taken directly to the Main Game Screen.

It's important to stop now and briefly describe the "phases" in the game and how the scoring system works. ***TalonSoft's 12 O'Clock High: Bombing the Reich*** is played in phases. The Allied player has a Raid Planning Phase, a Reaction Phase, and an Intelligence Briefing Phase. The Axis player has a Movement Phase and a Reaction Phase.

As the Allied player, when you first enter the Main Game Screen, you begin in the Raid Planning Phase. It is in this phase that you will begin planning your upcoming day's raids against Axis targets. For this simple tutorial, we will walk you through the planning of three bombing raids against the ball bearings factories of Kugelfischer and Vereinigte #1 and #2, which are located near the Schweinfurt area. Your goal in targeting these three factories is to earn enough industrial damage points to win.

"How Do I Score Points?"

Good question! There are two different scor
O'Clock High: Bombing the Reich. To read a
scoring systems work, please refer to page
information below.

Air Superiority	2	Turn/End: 1/1
Industry Damage	2	
Terror	3	to win: 10

Terror Air Superiority reflects the current "
the Allied and Axis air forces; Industry Da
damage sustained by industrial targets; an
caused by urban areas. Notice that these
points in them. Most scenarios in the gam
having some points. It's your goal, then, as
these points to earn victory. The total poin
to the right of the damage categories. If you
this "to win" number, you win!

In this introductory scenario, the scorin
that you receive triple points for all damage
tories. This is why you are going to
Schweinfurt. Though they are not the only
scenario, they are the best and will yield
points than many of the others. You start
damage points, and 7 points total. You nee

Bombing Mission

(4) Looking at
Screen, you'll no
swarming sea of gray, yellow, and blue tar
but don't worry. There's an easy way to
attack. *To begin plotting your bombing m
Mission" on the Allied Planning Phase Tab*
ton places you in the planning sub-tab. Y
first bombing mission.

tory Scenario:
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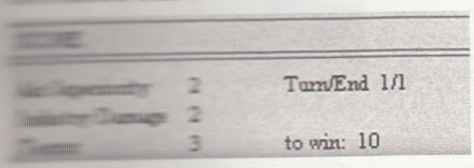
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TalonSoft's 12 O'Clock High:
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Axis targets. For this simple
ning of three bombing raids
scher and Vereinigte #1 and
area. Your goal in targeting
strial damage points to win.

You win by having a total score of 10 or more points by the end of the turn.

How Do I Score Points?

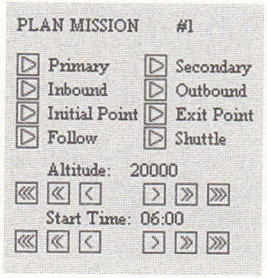
Good question! There are two different scoring systems in ***TalonSoft's 12 O'Clock High: Bombing the Reich.*** To read a full description on how these scoring systems work, please refer to page 89. For now, just follow the information below.



The graphic to the left has your score divided between the damage categories of Air Superiority, Industry Damage, and Terror. Air Superiority reflects the current "readiness" difference between the Allied and Axis air forces; Industry Damage reflects the amount of damage sustained by industrial targets; and Terror reflects damage sustained by urban areas. Notice that these categories already start with points in them. Most scenarios in the game start with the Allied player having some points. It's your goal, then, as the Allied player, to increase these points to earn victory. The total points needed to win is displayed to the right of the damage categories. If your final points equal or exceed this "to win" number, you win!

In this introductory scenario, the scoring system has been adjusted so that you receive triple points for all damage delivered to ball bearings factories. This is why you are going to target the factories around Schweinfurt. Though they are not the only ball bearings factories in this scenario, they are the best and will yield you more Industry Damage points than many of the others. You start this scenario with 2 industrial damage points, and 7 points total. You need only 3 more points to win.

Bombing Mission (4) Looking at the map on the Main Game Screen, you'll notice a lot of target icons. This swarming sea of gray, yellow, and blue targets might seem intimidating, but don't worry. There's an easy way to find the factories you need to attack. *To begin plotting your bombing missions, first select "Bombing Mission" on the Allied Planning Phase Tab to the right.* Clicking this button places you in the planning sub-tab. You are now ready to plot your first bombing mission.

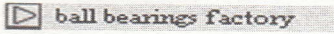


At the top of the tab are the words "PLAN MISSION #1". This means the game is ready to take your first mission order. *To plan your first mission, select the "Primary" button*. This tells the computer that you will select the primary target for your raid. Once you've done this, you are ready to select Kugelfischer as the first target.



(5) On the bottom tab is a button called "list targets." *Click this button to open a list of available targets.* From this target list, you will choose ball bearings factories.

area	975	1	aircraft factory	821	0
radar site	190	0	engine factory	799	0
primary airfield	2568	0	avionics factory	979	0
aluminum factory	560	0	armaments factory	3265	0
oil storage	810	0	U-Boat factory	1183	0
oil refinery	1192	0	V-Weapons factory	326	0
chemical factory	1255	0	V-Weapons site	0	0
synthetic fuel refinery	1641	0	railyard	8761	1
ball bearings factory	1110	0	port	1531	0
electric power plant	3924	0			
steel factory	822	0			
rubber factory	1160	6			



(6) *On the List Targets Tab, select the "ball bearings factory" button.* The list of ball bearings factories appear.

On this list, first select the column heading "capacity" to sort the factory list from highest capacity to lowest. Once you've done this, notice that Kugelfischer sorts to the top. This is because Kugelfischer has the highest capacity of any ball bearings factory in the game, and thus is the best factory to attack for this scenario. To read more about target capacity, see p. 42.

name	damage	capacity	AA guns	balloons	last photo	
Kugelfischer	0	28	0	0	38	target
Vereinigte #1	0	14	0	0	52	target
Steyer	0	12	0	0	48	target
Vereinigte #2	0	10	0	0	41	target
Cannstadtt	0	8	0	0	33	target
Erkner	0	7	0	0	32	target
Engelsdorf	0	6	0	0	41	target
Lang	0	3	0	0	35	target
Alfortville	0	2	0	0	33	target
Blankenloch	0	2	0	0	54	target
Elberfeld	0	0	0	0	none	target



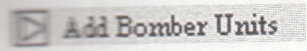
(7) *To choose Kugelfischer for attack, select the word "target" to its far right.* Immediately, the target list tab collapses and Kugelfischer is marked on the map with a white and red line connected to an airfield in England. These lines represent the flight path your raid will follow inbound (white) and outbound (red). You can modify this flight path in many ways (*see p. 71*), but for this tutorial, we'll leave the flight paths alone.



(8) As soon as you selected Kugelfischer as the primary target, the "Pick Lead Unit" button appeared on the planning sub-tab. *Click this button to open a list of available units on the bottom tab.*

306th Pathfinder	B-17G Fortress	*	1	69	68
306th Pathfinder	B-24J Liberator	*	1	73	69
92nd BG	B-17F Fortress	>>	22	67	65

(9) *On this list, find and select the 92nd BG, a unit of B-17F Fortresses.* You can scroll the list down to find the unit. This unit will be the raid's "lead" unit. A lead bomber unit is the unit in a raid which takes the point in the formation. *Once you've selected this unit, click "Done" in the bottom left hand corner of the bottom tab.*



(10) Once you have selected the lead unit, you'll notice that another set of buttons appear on the planning sub-tab. *To add extra bombers that will accompany the "lead" unit to the target, select "Add Bomber Units."*

91st BG	B-17F Fortress		24	65	69	47
92nd BG	B-17F Fortress	L	22	58	67	50
94th BG	B-17F Fortress	b	21	58	72	41
95th BG	B-17F Fortress	b	24	61	59	6
96th BG	B-17F Fortress		21	56	58	36

(11) *On this list, find and select the 94th and 95th BG. These units will accompany the lead unit (marked with an "L") to Kugelfischer.* You have now finished adding bomber units to the raid and are ready to add escort fighters. *Click "Done" in the bottom left hand corner of the bottom tab.*

Add Fighter Escorts (12) Now that you have assigned all bombers to the raid, you are ready to support them by adding escort fighters. *To add escort fighters, select "Add Fighter Escort."*

352nd FG	P-47C Thunderbolt	ce	48	70	53
353rd FG	P-47C Thunderbolt	ce	48	63	56
355th FG	P-47C Thunderbolt	ce	46	66	52
4th FG	P-47C Thunderbolt		48	70	69
56th FG	P-47C Thunderbolt		43	77	71
78th FG	P-47C Thunderbolt		48	69	68

(13) *On the escort fighter list that appears on the bottom tab, find and select the 352nd, the 353rd , and the 355th P-47C Thunderbolt fighter groups.* As soon as they are selected, you'll notice a "ce" appearing beside their names. This means that these fighters will conduct a "close" escort of the bomber units. You may also put fighters on high escort (he). *See details on p.77. For now, however, leave these units on close escort, and select "Done" to close the tab and end mission plotting for mission #1.*

Note: As you selected each fighter escort, you may have noticed that a green box, green line, and yellow box appeared alongside the inbound/outbound flight path of the raid. These elements indicate where the escort unit will form-up with the raid (green box), the distance it will protect the bombers (green line), and where it will turn around and go home (yellow box). You can modify the location of these elements by first selecting an escort unit in the list (as you are assigning them), and then right clicking anywhere on the flight path. Adjusting these elements changes the escort unit's "delay" time. For more details about escort delay and what it means, see p. 78. But for now, leave these elements alone and proceed with the next step below.

New Mission (14) After assigning escorts to the raid, you are ready to close mission #1 and start mission #2. *To do this, select "New Mission" on the planning sub-tab.* This secures your mission #1 assignments, and sets you up to begin plotting the next mission.

(15) *Following the steps above, plot bombing mission #2 against the ball bearings factory of Vereinigte #1.* Remember to pick a "lead" bomber unit, extra bombers (2-3 extras), and 2-3 escorts. *When you are finished, select "New Mission" again to plot mission #3.*

that you have assigned all
he raid, you are ready to sup-
add escort fighters, select "Add

ce	48	70	53
ce	48	63	56
ce	46	66	52
	48	70	69
	43	77	71
	48	69	68

s on the bottom tab, find and
th P-47C Thunderbolt fighter
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Adjusting these elements
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#1 and start mission #2. *To*
sub-tab. This secures your
in plotting the next mission.

mission #2 against the ball
pick a "lead" bomber unit,
hen you are finished, select

Now following the steps above, *plot bombing mission #3 against the ball bearings factory at Werningie #2.* Again, pick a "lead" bomber unit, extra bombers, and escorts (if any are left). Notice that by the time you plot this final mission, you may not have any more escort fighters. This happens from time to time, because you have finite resources. If no escort units appear on the escort list as you're plotting, simply pass over the step. *When you are finished plotting your third and final raid, click "Done" on the planning sub-tab.*

End Phase

(17) Now that you are finished plotting your missions, you are ready to enter the Reaction Phase and watch your bombers do their work. *To do so, click the "End Phase" button on the bottom tab of the Raid Planning Phase tab.* This places you in the reaction phase.

The Reaction Phase is where you, as the Allied player, will sit back and watch your raids in action. Once you click the "START" button in this phase, the clock begins and the phase continues until your raids have run the missions and a score is determined.

START

(18) *To begin the Reaction Phase, click the "START" button.* The button immediately becomes "STOP" and you may click it on/off to start/stop the Reaction Phase as you wish. For this tutorial, however, just sit back, relax, and watch your B-17s and P-47s fly across the Channel en route to the unsuspecting factories around Schweinfurt.

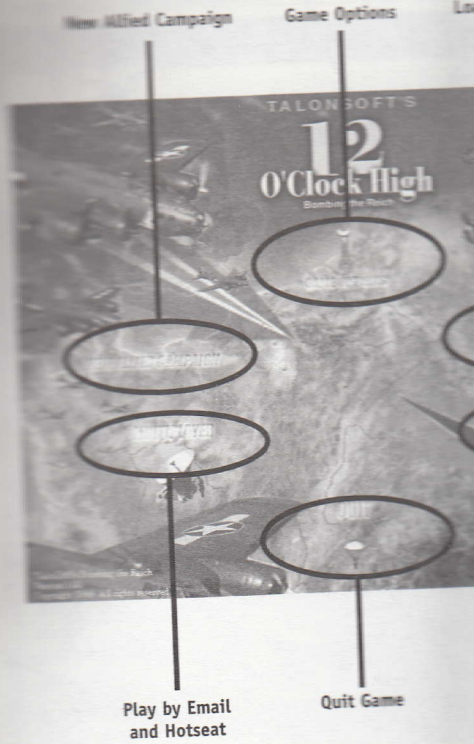
To get a better view of the map and the area of play, we recommend that you click the full screen button which appears on the bottom of the Preference Toolbar. This collapses the tabs and puts the map in full screen. This is the best way to play the game. For more details about this feature, *see p. 22.*

Watching the Reaction Phase: The first thing you'll notice when you begin the Reaction Phase is the radio activity in the bottom right hand corner. The black stripes at the top and bottom of the minimap display the radio activity that is created by your units as they form up and take off. Your raids will eventually appear (depending upon their launch times), and will fly over the Channel until they reach their targets. But it's not as easy as that. Your Axis opponent will scramble his air units to intercept your raids, and as the two forces converge, attack messages appear giving you details about how many of your aircraft are being shot down, and vice-versa. The Reaction Phase may take awhile to complete, as the game is constantly updating and calculating data to generate a final score. Once all of your units land, the introductory scenario ends and you will either win or lose, depending upon the success of your raids.

Plot More Raids: Now that you have successfully completed the tutorial, you are ready to try again. Follow the steps above a few more times and plot more raids against even more ball bearings factories. Or, try your hand at attacking other industrial sites, railyards, and ports. In this scenario, you score triple points for hitting ball bearings factories, but you score normal points for hitting other targets *(see p. 89)*. You may find a winning strategy that doesn't include hitting ball bearings factories at all. In addition, changing the altitude of your raids (see p. 73), or staggering their launch times (see p. 78) can greatly change the dynamic (and outcome) of the battle. You are welcome to plot any combination of missions, provided the resources are there. Be creative. And have fun.

To get a full understanding of how all functions in ***TalonSoft's 12 O'Clock High: Bombing the Reich*** work, refer to Chapter V. "Playing the Game."





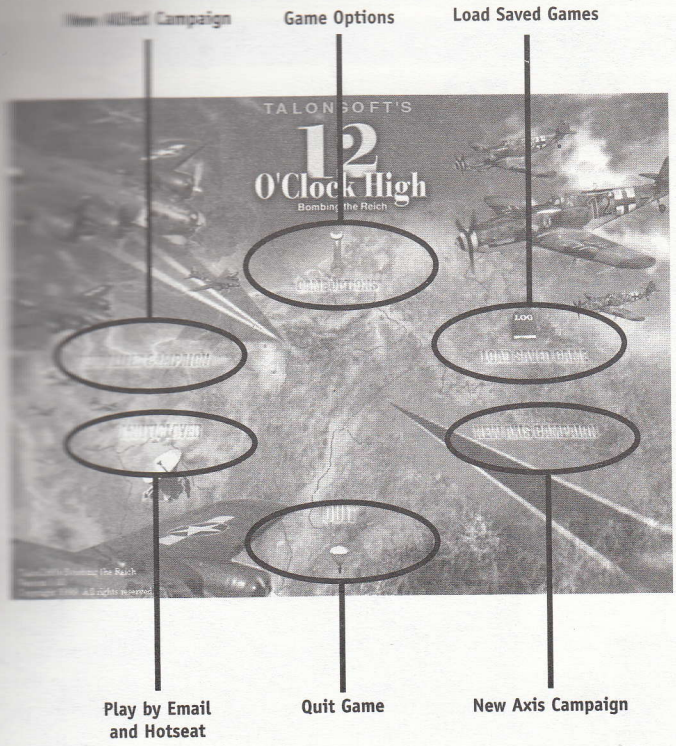
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[illegible] OVERVIEW

[illegible]

[illegible], the Start-up Screen appears. On this screen, [illegible] whether to start a new campaign or to continue a saved campaign, [illegible] gaming options, or begin or continue a play-by-E-mail game. To [illegible] an option, move the cursor over your selection, then left-click to [illegible].

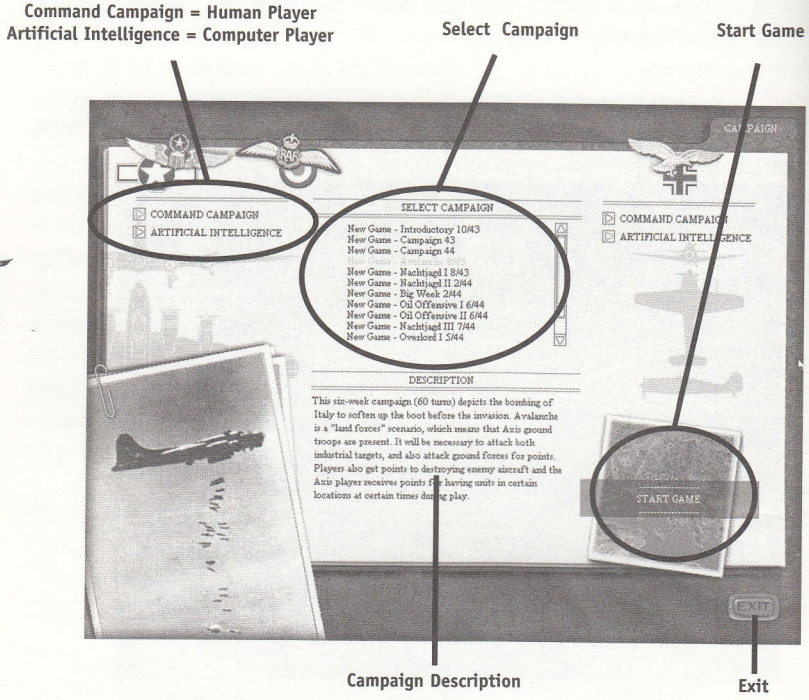


Interface Overview

Setting Game Options on Start-up Screen: Setting your game options here only sets the options for the front end of the game (i.e., load screen, multiplayer screen, camp. selection screen, etc.). To set options for game play, you must set them once you get to the Main Game Screen (see p. 27).

Campaign Selection Screen

To start a new campaign, select either *"New Axis Campaign"* or *"New Allied Campaign"* on the Start-up Screen. Once you've done so, the Campaign Selection Screen appears.



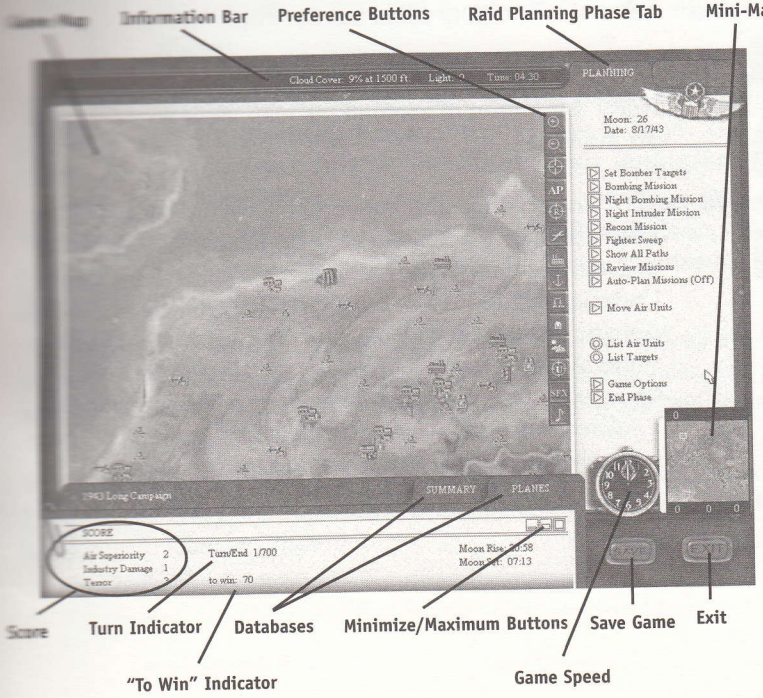
Making your selection to begin either a new Axis or Allied campaign on the Start-up Screen automatically sets you up to play that side. In the top corners of the Campaign Selection Screen, there are two settings: Command Campaign and Artificial Intelligence. If you are playing as the Allies, "Command Campaign" is highlighted and means that you will command the Allies. The computer will automatically default to "Artificial Intelligence" and play the other side. These settings can be changed once you enter this screen.

...on the screen, decide which campaign you'd like to play. Select one by clicking on its name. When you've made your selection, a brief description of the scenario appears below the campaign list. Once you are finished reading the description, click on the game map in the bottom right-hand corner (it should now be marked with "Start Game"). Clicking the game map takes you to the loading screen; the campaign loads and mission begins. See p. 42 for more details about the different campaigns.

> **Note:** Vachtjagd I, II, III, and Oil Offensive II can be played as "one-week" scenarios. After selecting one of these scenarios, the option to switch to the smaller version appears. Select the option if you wish, and then start the game.

Main Game Screen

Once beyond the Campaign Selection and Loading Screens, you are ready to begin play. All play of *TalonSoft's 12 O'Clock High: Bombing the Reich* is conducted on the Main Game Screen.



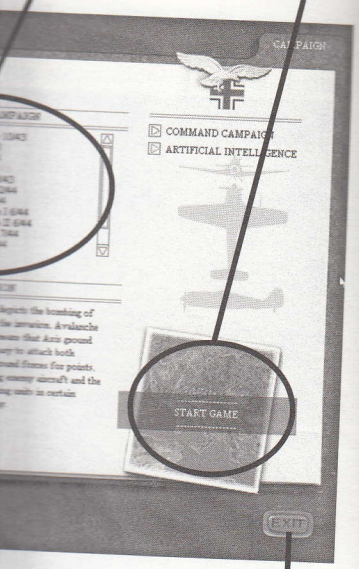
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Start Game



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Exit

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Interface Overview

Game Map - The Game Map shows the area of operation (i.e., where the game is played). All Allied raids are launched from the British Isles or from bases around the Mediterranean Sea; or, in certain scenarios, from Italy and Russia. The European mainland, on the other hand, contains not only all the primary airfields where interceptors and patrols will be launched, but also shows all Axis targets which can be selected for bombing by the Allied player.

You can move about the map at any time (and in any phase of the game) by sliding the mouse pointer off the side of the screen in the desired direction. (See the zoom-in and zoom-out functions and mini-map, below.)

Information Bar - The information bar at the top of the screen lists the day's cloud cover and light, times the moon rises and sets, and the actual time of the current Reaction Phase. In full-screen mode, it lists even more information. See p. 49 for more details.

Preference Tool Bar - This tool bar allows you to toggle on/off and highlight various visual preferences during game play. These preferences come in handy to keep "visual" tabs on all that's occurring on the map. Below is a detailed description of each preference button.

Zoom-out: Select this button to zoom out the map.



Zoom-in: Select this button to zoom in the map. Four levels of zoom are available.



Highlight Target Damage: Select this button to highlight all targets on the map with colored outlines. The colors represent the amount of damage the target has sustained. Light/Bright Green = Undamaged target; Yellow = 1-24% damage; Orange = 25-49% damage; Red = over 50+% damage. This highlighting function works in the far zoom-out mode as well, but at that range, the target icons are color-coded (rather than being surrounded by a colored highlight). Use this highlighting function to get a comprehensive overview of target damage.



Highlight Locations with Anti-Aircraft (AA) Guns: Select this button to highlight all Axis locations which currently house anti-aircraft (AA) guns. *This feature appears only to the Axis player during his Movement Phase.*

Highlight Locations with Balloon Barrages: Select this button to highlight all Axis locations which currently house balloon barrages. *This feature appears only to the Axis player during his Movement Phase.*

Highlight Airfields with Axis Air Units: Select this button to highlight all Axis airfields which currently house air units. *This feature appears only to the Axis player during his Movement Phase.*

Highlight Locations with Current Recon Photos: Select this button to highlight all Axis locations that have a current Allied recon photo. A "current" photo is a photo that is either one or two days old. Any recon photo over two days old is not reliable. *This feature appears only to the Allied player during his Raid Planning Phase.* See p. 80 for more information about recon photos.

Highlight Airfields with Allied Air Units: Select this button to highlight all Allied airfields which currently house air units. *This feature appears only to the Allied player during his Raid Planning Phase.*

Toggle on/off Airfields: Select this button to toggle all Airfields on and off. *This feature appears only to the Allied player during his Raid Planning Phase.*

Toggle on/off Factories: Select this button to toggle on and off all Axis industry, including rail yards and oil storage facilities. *This feature appears only to the Allied player during his Raid Planning Phase.*

Toggle on/off Ports: Select this button to toggle on and off all Axis ports. *This feature appears only to the Allied player during his Raid Planning Phase.*

Interface Overview

Toggle on/off Radar Range: Select this button to toggle on and off red range rings around all Axis radar sites. These rings indicate the range at which aircraft can be reliably detected. Note: During the play of certain Nachtjagd scenarios, the British employ radar-jamming devices that block Axis radar. the README file for more details.

Show Urban Areas (and damage): Select this button to show only Axis urban areas (all other target icons are suppressed). The red circles indicate the actual area of the urban site. Damage sustained to urban blocks outside the red circles have no effect on scoring. Damage to urban areas are represented by various hues of yellow: the brighter the yellow, the higher the damage level. Red dots in urban areas represent fires, and these fires mean that damage can spread to adjacent areas. Fires can also increase the damage level of the area where they are burning. See p. 91 for more information.

Toggle on/off Targeted Locations: Select this button to toggle on and off all Axis targets which have already been selected for attack. *This feature appears only to the Allied player during his Raid Planning Phase.*

Toggle on/off Cloud Cover: Select this button to toggle on and off clouds. See p. 50 for more information about the effects of cloud cover.

Toggle on/off Sound Effects: Select this button to toggle on and off game sound effects.

Toggle on/off Music: Select this button to toggle on and off game music.

this button to toggle on and off red
Axis radar sites. These rings indicate
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The following functions / buttons are available during the reaction phase (Allied or Axis) only:



Highlight Allied Aircraft: Select this button to highlight all Allied aircraft with "status" colors. This function only works during a reaction phase with 3D aircraft turned on. The colors are: Orange = incoming raids; Red = outgoing raids.



Highlight Axis Aircraft: Select this button to highlight all Axis aircraft with "status" colors. This function only works during a reaction phase with 3D aircraft turned on. The colors are: Black = interceptors; Green = patrols; Blue = units returning home.



Toggle on/off Flight Lines: Select this button to toggle off 3D aircraft and play the game with "status" colored boxes and flight lines instead (rather like the traditional map displays actually used during WWII). This is a useful option for players experiencing very slow Reaction Phases. ***NOTE: this function turns off 3D aircraft and aircraft highlighting, overriding their buttons, even if they've been selected (green). The colors for each side are as follows:***

Allied

Orange Boxes and Lines = inbound fighter sweeps and bomber formations
Orange Boxes only = high escort, recon and night intruder formations
Red Boxes = returning raids

Axis

Black/White Boxes and Black Lines = interceptors
Green Boxes and Lines = patrols
Blue Boxes = air units returning home

The size of the box also indicates the approximate size of the unit. The larger the box, the more aircraft in the raid.

Interface Overview

Toggle on/off Stragglers: Select this button to toggle on and off units classified as "stragglers". A "straggler" is a unit that breaks off from the main element of the raid due to shortage of fuel or damage. The purpose of this feature is to help reduce aircraft clutter on the map. Stragglers occur on both sides.



Toggle on/off Following Bomber Units: Select this button to toggle on and off all non-lead Allied aircraft, and instead show their shadows only. This feature only works when you are playing the game with 3D aircraft turned on. The purpose of this feature is to help reduce aircraft clutter on the map. See p. 75 for more information about Allied "lead" and "non-lead" units.



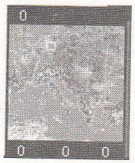
Toggle Back/Forth Between Full Screen: When selected (toggled), this function suppresses the bottom and right tabs, the clock face, and save and exit buttons, and enlarges the game map to full screen (with expanded information bar at the top). The mini-map (see below) remains as an inset.



Watch Face - During the Reaction Phase, you may click on this watch face to increase game speed. There are four game speeds: x1, x2, x4, x8.



Mini-map - The mini-map displays a miniature of the entire area of play. You may click on this map to shift around to other areas of the map to view the action. The dots appearing here represent the air units as they move around the map. The colors correspond to the "flight line" colors designating Allied and Axis units on the main map. The red outline on the mini-map indicates the available area of play for the current campaign; the yellow outline indicates the area displayed on the main map at the current zoom level (either normal or full-screen mode).



Mini-map and Radio Activity: The mini-map is divided into six sectors (three on the top and three across the bottom). The numbers in the black bars above and below the mini-map indicate the level of Allied radio communication activity in each sector; you'll see them build and peak before a raid, then taper off as the raid progresses. Typically, you'll see radio activity only in the upper left hand corner, and in the first bottom two sectors.

Save Game: Click on this button to save the ga
ing. See p. 26 for more details.



Exit: Click on this button to exit the gam
up screen.



Right Tab System - During play, the right tab syste
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V. for more details. This
click the full map button
(see above).



Bottom Tab System - During play, th
minimizes/maximizes
features necessary fo
more details. One tab,
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"planes." This tab acc
and ground defenses
labeled "planes"). Yo
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Database Sorting: To make
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click on "load," and you'll see the
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ross the bottom). The numbers in
w the mini-map indicate the level
n activity in each sector; you'll see
a raid, then taper off as the raid
e radio activity only in the upper
rst bottom two sectors.



Save Game: Click on this button to save the game you're currently playing. *See p. 26 for more details.*



Done: Click on this button to exit the game and return to the start-up screen.

Right Tab System - During play, the right tab system changes to reveal information and features necessary for play. *See Chapter V.* for more details. This tab disappears when you click the full map button during the Reaction Phase (see above).



Bottom Tab System - During play, the bottom tab system minimizes/maximizes to reveal information and features necessary for play. *See Chapter V. for more details.* One tab, however, that appears as part of the bottom tab system is labeled "planes." This tab accesses databases of aircraft and ground defenses (even though it's only labeled "planes"). You may click on it at any time during play to check or review complete information on the performance and capabilities of any aircraft or weapons system (Allied or Axis) that appears in the game. See below for more details.



Database Sorting: To make it simpler to wade through this mass of data, all the databases can be sorted automatically. Just click on any column heading, and the database will be sorted (highest to lowest) according to that heading. For example, to see which Allied bomber can carry the largest bomb load, click on "load," and you'll see the database re-ordered with the heavy bombers first. Similarly, click on "speed," and the database will be sorted with the fastest fighters at the top.

Interface Overview

Planes: Each aircraft has a list of statistics: its speed (combat speed), cruise (its normal speed when flying in formation), maximum altitude (how high it can fly), climb rate (number of feet per minute it can climb), maneuverability (ability to position itself effectively for combat), durability (how much punishment it can take before it goes down), armor value (its ability to reduce or withstand damage when hit by enemy shells during combat), endurance (the number of minutes it can fly), load (maximum weapons payload), gun value (a gun strength summation of the aircraft), and type. *To view full details about any aircraft, simply click on its name in the left column of the database.*

Aircraft	Speed	Cruise	Max Alt	Climb	Mvr	Durab	Armor	Endure	Load	Gun Value	Type
A-20B Boston	350	278	28600	1500	17	35	1	240	2000	13	level bomber
A-20G Havoc	342	272	25800	1800	16	36	1	250	4000	31	level bomber
A-26B Invader	355	280	31300	1235	20	42	1	335	6000	30	level bomber
A-36A Apache	390	270	32000	1852	32	32	2	250	1000	18	fighter bomber
B-17F Fortress	317	180	35000	600	4	68	1	660	6800	26	level bomber
B-17G Fortress	287	180	31500	600	4	69	1	660	6800	36	level bomber
B-24D Liberator	303	190	32000	909	3	60	1	600	8800	30	level bomber

A good way to review this information is to look at an aircraft's attributes in comparison with other (similar) aircraft. For example, looking at Axis fighters, the Me 109K-4 is a bit more maneuverable than the FW 190D, and climbs and cruises faster (although its maximum combat speed is the same)—but the 190 is a bit more heavily armed and, most important, can stay aloft *more than twice as long*. Or compare Allied medium bombers: The B25G and Mosquito BXVI have the same 4000-lb bomb load, but the Mossie's combat speed is 415 mph against the Marauder's 280 (which is why most Mosquitos neither had, nor needed, defensive armament—they could simply run away from almost any Axis attacker).

Aircraft Armaments Details: Clicking on an aircraft name opens that aircraft's details tab. Listed here, in addition to a recap of its line in the main database, are the selected aircraft's guns (the number of each and their fields of fire, effectiveness and range), bomb load (if bombers), and any radar or electronic aviation components that the aircraft might have.

The gun fields of fire are listed as F = front; TT = top turret; TR = top rear; R = rear (tail gun); BR = bottom rear; BT = bottom turret; and S = side. A gun is only useable in its specific field of fire (unless it's a turret). Thus, depending upon what direction the attack is coming from, only certain guns are effective. For example, a B-17G being attacked from the front by FW-190s can defend itself only with its forward-facing guns. This means that even though the B-17G has a significant gun value, its total firepower may not be available for defense, depending on the direction from which it's attacked.

f statistics: its speed (combat speed), ing in formation), maximum altitude mber of feet per minute it can climb), itself effectively for combat), durabil- ake before it goes down), armor value amage when hit by enemy shells dur- er of minutes it can fly), load (maxi- (a gun strength summation of the air- *about any aircraft, simply click on its ase.*

	Durab	Armor	Endure	Load	Gun Value	Type
7	35	1	240	2000	13	level bomber
5	36	1	250	4000	31	level bomber
0	42	1	335	6000	30	level bomber
2	32	2	250	1000	18	fighter bomber
	68	1	660	6800	26	level bomber
	69	1	660	6800	36	level bomber
	60	1	600	8800	30	level bomber

on is to look at an aircraft's attributes ircraft. For example, looking at Axis e maneuverable than the FW 190D, gh its maximum combat speed is the vily armed and, most important, can r compare Allied medium bombers: he same 4000-lb bomb load, but the gainst the Marauder's 280 (which is needed, defensive armament—they ny Axis attacker).

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F = front; TT = top turret; TR = top rear; BT = bottom turret; and S = ific field of fire (unless it's a turret). n the attack is coming from, only e, a B-17G being attacked from the y with its forward-facing guns. This as a significant gun value, its total efense, depending on the direction

	Speed	Cruise	Max Alt	Climb	Mvr	Durab	Armor	Endure	Load	Gun Value	Type
	287	180	31500	600	4	69	1	660	6800	36	level bomber

				Effect	Penetration	Range	Accuracy
	x 2	F	gun	3	2	2000	29
	x 2	TT	gun	3	2	2000	29
	x 2	BT	gun	3	2	2000	29
	x 4	S	gun	3	2	2000	29
	x 2	R	gun	3	2	2000	29

				Reduced Load			
	x 12	INT	GP bomb	500 lb Bomb		x 2	INT GP bomb
	x 8	INT	incendiary	100lb ICB Cluster		x 2	INT incendiary
	815 miles			extended radius		1515 miles	

Bombers (and fighter/bombers or fighters with ground-attack capabili- have additional bomb load information. Internal (INT) and external bomb locations are listed for information only and do not affect air- craft performance. A full bomb load, however, will reduce any bomber's cruise speed by 30 mph.

A further column of information on this screen details maximum vs. reduced bomb loads. To carry its maximum bomb load, a bomber cannot be fueled to maximum capacity, thus reducing its radius of action. Conversely, by carrying a reduced bomb load, the fuel tanks can be "topped off," allowing longer-range missions deeper into Axis territory. Where this comes into play is when you, as the Allied player, assign bombers to mis- sions. Depending on the range of the mission, your bombers will reduce their bomb load for added distance. *Note: This reduction in bomb load only pertains to level bombers.*

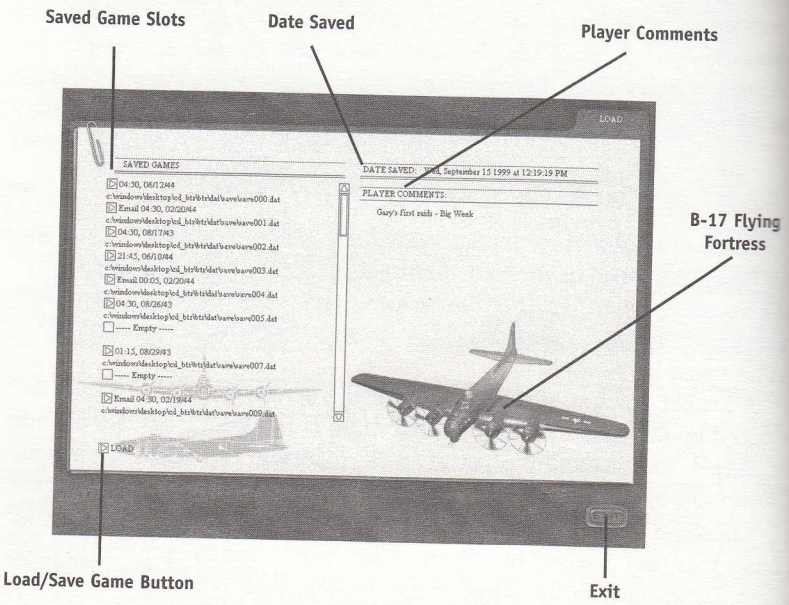
For night bombing, some of the high-explosive bombs (usually inter- nal loads) are traded for incendiary bombs. The pop-up help message which appears over a unit you've already assigned to the raid shows the aircraft type, its combat radius, and a full readout on its bomb load.

Ground defense weapons: This table lists range and effectiveness (based on factors such as rate of fire and size of shell) for various Axis anti-air- craft guns (Flak). Note that heavy AA shells (88mm and larger) have delay fuses and *cannot engage aircraft lower than 7500 feet when fired ver- tically.* (The minimum altitude may be somewhat lower when engaging a raid at significant horizontal distance from the gun position). Barrage balloons are fixed at 4000 feet.

Use of these extensive databases will help you make better decisions whether you're planning a bombing raid or setting up a fighter escort for the Allies, or choosing interceptor units and Flak batteries for the Axis.

Load/Save Game Screen

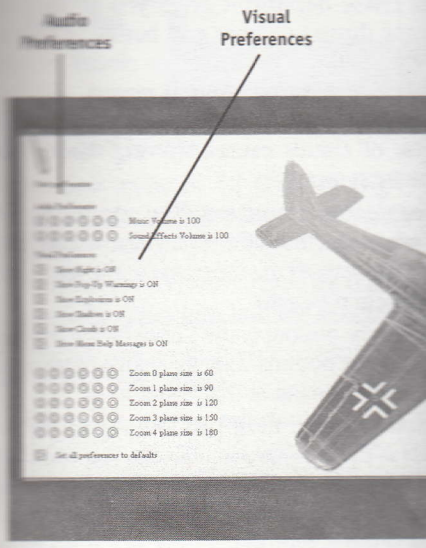
Select *"Load Saved Game"* on the Start-Up Screen to continue playing a previously saved game.



Along the left edge of the screen is a set of slots in which you can save games. The Save and Load buttons appear below the slots and are clicked to save/load a selected game accordingly. Along the right edge is the date area showing when the selected game was saved, and below that is the "player comments" box.

Loading a Saved Game: You can continue playing a saved game by first selecting *"Load Saved Game"* on the Start-up Screen. *Once on the Load/Save Game Screen, select the saved game you wish to begin playing by clicking on the button to the left of its name, then click "Load" at the bottom of the list.* The saved game will load immediately.

Auto Saved Games (the "Save000.dat" file): The top save slot on the Load Saved Game Screen is "Save000." This is an autosave file of the game you are currently playing. At the end of each turn, the game autosaves the game in this slot. If you do not save a game, or lose a saved game file, you can open this file and retrieve most of the last game you were playing.



(1) Audio Preferences

Music Volume Setting: Click the rad
music volume. Setting the volume to ze

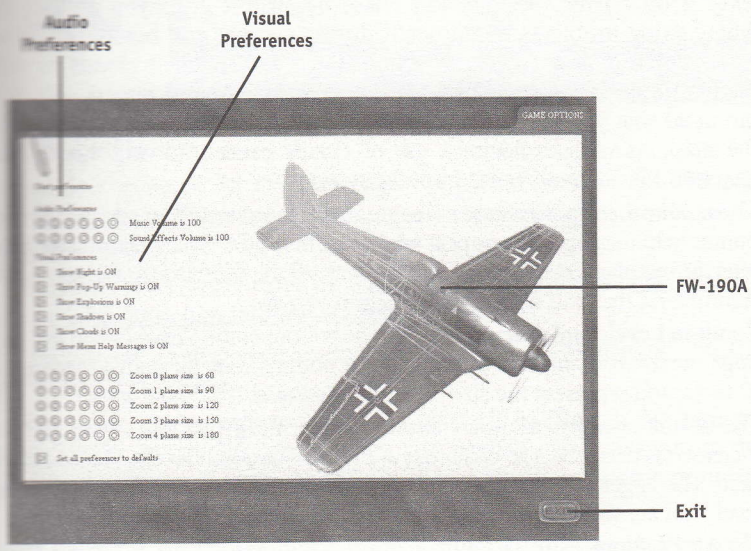
Saving a Game: During play, you may click on the save button in the bottom right-hand corner of the Main Game Screen. *Once on the Load/Save Game Screen, type in any information you wish about the game in the "player comments" box by clicking on the arrow appearing beside the box. Select a save location slot in the list along the left side of the screen, then click "Save."* Comments can only be added when a game is saved.

E-mail Games: Saved E-mail games are stored with regular saved games. However, the word "E-mail" is part of the game title to distinguish it from the others.

Deleting Old Saved Game Files: After awhile, you may have saved more games than desired, and may need to make room for new ones. To delete a saved game, use a utility such as "My Computer" or "Windows Explorer" to locate the main folder for ***Bombing the Reich*** (wherever you have stored it on your hard drive), and open the DAT\SAVE folder. Locate the desired "save" file(s), and *right-click on each to delete it.*

Game Options Screen

The Game Option Screen can be accessed on the Start-up Screen, and inside the game during all phases. On the Game Option Screen are various audio and graphical preferences you can toggle on and off. The options on the screen are as follows:



(1) Audio Preferences

Music Volume Setting: Click the radio buttons to increase/decrease music volume. Setting the volume to zero turns music off.

...iew

...e Start-Up Screen to continue playing



...s a set of slots in which you can save ...pear below the slots and are clicked ...gly. Along the right edge is the date ...e was saved, and below that is the

...tinue playing a saved game by first ...he Start-up Screen. *Once on the ...ed game you wish to begin playing ...f its name, then click "Load" at the* ...l load immediately.

...lat" file): The top save slot on the ... This is an autosave file of the game ...f each turn, the game autosaves the ...game, or lose a saved game file, you ... the last game you were playing.

Sound Effects Volume Setting: Click the radio buttons to increase/decrease sound effects volume. Setting the volume to zero turns sounds off.

(2) Visual Preferences

Show Night: Toggle this feature on/off to add or remove the function of having the game map shade darker during night hours.

Show Pop-up Warnings: Toggle this feature on/off to enable or disable the warning messages which pop up at the end of each phase of the game. These warning messages ask if you wish to end the current phase, or if you wish to end the game without saving it. If you don't want these warnings to appear, toggle this option OFF.

Show Explosions: Toggle this feature on/off to add or remove ground (bombing) and flak explosions during the Reaction Phase. If you wish to see explosions and flak bursts, toggle it ON. Note that this tends to slow the Reaction Phase on machines slower than 300-mHz Pentiums.

Show Shadows: Toggle this feature on/off to add or remove aircraft shadows. It's useful to toggle this feature OFF if you are experiencing major slow-downs during the Reaction Phase.

Show Clouds: Toggle this feature on/off to add or remove map clouds. This feature is toggled ON by default, and it's recommended that you leave it on during the Reaction Phase because it gives you an idea of where siting problems might occur during combat and bombing. There is a Preference Tool Bar button which allows you to toggle clouds on and off at will, and this is useful when trying to see ground targets. We recommend that you use the preference button to add/remove clouds from the map. As with explosions, use of clouds causes slowing during the Reaction Phase on slower computer systems.

Show Menu Help Messages: Toggle this feature on/off to add or remove button help messages that appear when you move the mouse arrow over buttons during play. Once you are familiar with all the functions in the game, we recommend that you turn off these help messages.

Zoom-in Levels and Aircraft Size: At the bottom of the Visual Preference settings, are five rows of radio buttons. These buttons coincide with a zoom level (0 to 4), and represent the size of the 3D aircraft at that zoom level.

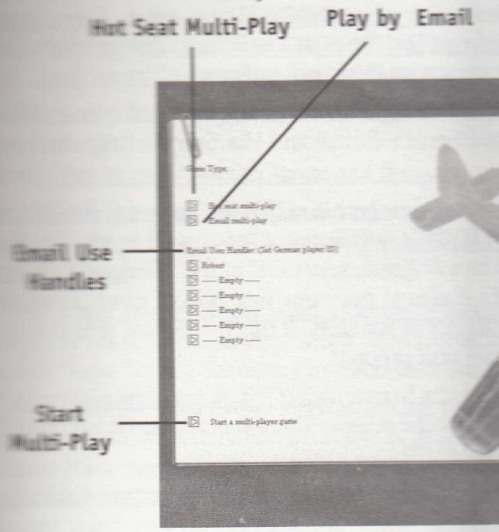
The default aircraft settings are appropriate for most play, but if you wish to increase/decrease the size of aircraft at the various zoom levels, you can do it here. The larger the number, the bigger the aircraft will appear at that zoom level. You are welcome to experiment with the sizes to suit your own tastes.

Set All Preferences to Defaults: Click this button to revert all settings back to default.

Lock Current Preferences for all Games: Click this button to lock in all settings. This feature appears only inside the game from one of the phases. This feature allows you to save different settings for Allied and Axis.

Multiplayer Screen

Select "Multiplayer" on the Start-Up Screen to be
mail or Hot Seat game between two human p
O'Clock High: **Bombing the Reich** allows only H
Before setting up a Hot Seat or E-mail game, select one o
read the directions carefully.



(3) Hot Seat Games

A Hot Seat game of ***12 O'Clock High*** is playe
opponents on one machine, taking turns condu
To start a Hot Seat game, follow these steps:

(1) The Axis Player begins *by selecting "Multi
Screen. This takes him into the Mutiplayer Screen*

(2) On the Multiplayer Screen, *select "Hot*
upper left hand corner.

(3) Once you've selected hot seat play, *cli
Game" in the bottom left hand corner*. This imme
Campaign Selection Screen. **NOTE**: It isn't neces
a "handle" for Hot Seat play.

(4) *On the Campaign Selection Screen, cho
played and start the game normally.*

(5) The Allied and Axis players will take turn
phases.

(6) Play the game until conclusion, or save
play, and continue later.

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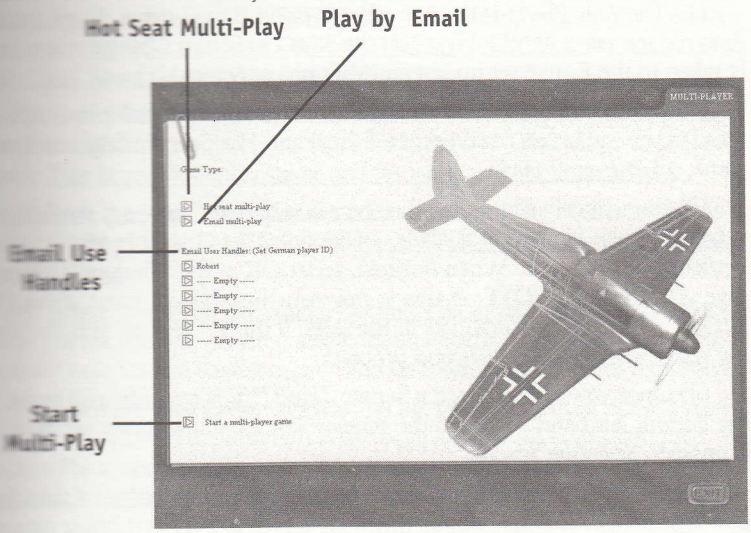
ropriate for most play, but if you wish to at the various zoom levels, you can do it gger the aircraft will appear at that zoom nt with the sizes to suit your own tastes.

lick this button to revert all settings back

for all Games: Click this button to ure appears only inside the game from re allows you to save different settings

Multiplayer Screen

Select "Multiplayer" on the Start-Up Screen to begin either a Play-by-E-mail or Hot Seat game between two human players. ***TalonSoft's 12 O'Clock High: Bombing the Reich*** allows only Hot Seat and E-mail Play. To set up a Hot Seat or E-mail game, select one of the options below and read the directions carefully.



Hot Seat Games

A Hot Seat game of ***12 O'Clock High*** is played between two human opponents on one machine, taking turns conducting their phases. To start a Hot Seat game, follow these steps:

(1) The Axis Player begins *by selecting "Multiplayer" on the Start-Up Screen. This takes him into the Mutiplayer Screen.*

(2) On the Multiplayer Screen, *select "Hot Seat Multiplay"* in the upper left hand corner.

(3) Once you've selected hot seat play, *click "Start a Multiplayer Game" in the bottom left hand corner*. This immediately takes you to the Campaign Selection Screen. **NOTE**: It isn't necessary to choose or create a "handle" for Hot Seat play.

(4) *On the Campaign Selection Screen, choose the campaign to be played and start the game normally.*

(5) The Allied and Axis players will take turns executing their phases.

(6) Play the game until conclusion, or save the game during play, and continue later.

(B) E-MAIL GAMES

An E-mail game of *12 O'clock High* is played between two human opponents, taking turns conducting their phases and then sending the saved game file via E-mail. This process continues until the game is finished. To begin an E-mail game, follow the steps below:

The Axis Player

(1) The Axis Player is the one who starts an E-mail game. *If you are the Axis player, select "Multiplayer"* on the Start-Up Screen. You are immediately taken to the E-mail set up screen (Multiplayer Screen).

(2) On the multiplayer screen, you have two different multiplayer options listed in the upper left-hand corner: E-mail and Hot Seat. To begin an E-mail game, *select E-mail play*.

(3) Immediately after doing this, *type in a "handle" in one of the slots provided.* This can be your real name, a fake name, or any other kind of number/letter combination. When finished, select OK in the Window text box to save your handle. **NOTE:** If this is not your first E-mail game, there may already be one or more handles in the slots. If this is the case, you may simply select one of the handles and proceed.

(4) Once you have selected a handle, *select "Start a multiplayer game"* in the bottom left hand corner of the screen. You are immediately taken to the Campaign Selection Screen.

(5) On the Campaign Selection Screen, *select a campaign to start (you and your opponent should decide which campaign to play first before proceeding). After selecting a campaign, select Start in the bottom right hand corner and the game loads normally.*

(6) Once you are in the game, the Axis player takes his first Movement Phase. Once you are finished, YOU MUST *SELECT "End Phase"* to end the phase. Once you do this, you are immediately taken to the Saved Game Screen. **NOTE:** It's very important that you remember to "End Phase" your Movement Phase. Otherwise, the system cannot determine that your turn is over, which will cause problems when the file is sent to your opponent.

(7) *On the Save Game Screen, save your game normally*. You will notice that the name of the saved game has the prefix "E-mail." That tells you that this saved game is an E-mail game. You may also wish to type in a comment under Player Comments during the save, such as telling your opponent which turn you are on, things to look out for, etc.)

(8) When you are finished saving your first Movement Phase, *exit the game, and send the saved file to the Allied Player* (which can be found under DAT\SAVE in your main *12 O'clock High* folder group).

High is played between two human oppo-
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system cannot determine that your turn is
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You may also wish to type in a comment
he save, such as telling your opponent
ok out for, etc.)

ving your first Movement Phase, *exit the*
Allied Player (which can be found under
High folder group).

NOTE: It's recommended that you "zip" (compress) the saved file before sending it, as the size of saved games can be as large as 5 Mb. This can also help prevent file corruption during transmission; just be sure to send the file as a binary file, and advise your opponent that the it must be "unzipped" (decompressed) before it can be used.

The Allied Player

(1) As the Allied Player, *when you receive the saved game from the Axis Player, copy it into your DAT/SAVE folder* (after unzipping it, if necessary). *Once you've copied it into your DAT/SAVE folder, open it up normally by going under Load Saved Game in the Start-up Screen.*

(2) As soon as you open it, it will begin to load, and you will be prompted with the Multiplayer Screen to type in a Handle ID (just like in Axis Step 4 above). *Type in an ID number/name and the game will continue to load.*

(3) Once the game loads, you are taken into a Briefing Phase. Since this is the first Briefing Phase, it will be blank. *Press "END PHASE" to enter your Raid Planning Phase.*

(4) *When you reach the Raid Planning Phase, plan your day's attacks.* When you are finished playing, select "END PHASE," and you'll be taken to the Save Game Screen. Save the game and then send it back to the Axis Player.

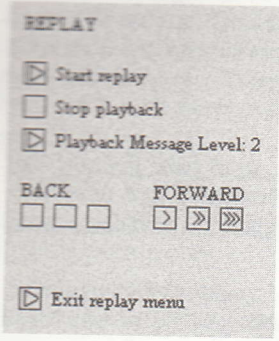
(5) When the Axis Player receives the file back, he should open it under Load Game, and then the Reaction Phase begins. The Axis player conducts the Reaction Phase normally, then his next Movement Phase, and then he will send the file back to the Allied player, etc. until the game is finished.

THINGS TO REMEMBER: Do not exit out of a Phase without clicking "END PHASE". Otherwise, the game doesn't know that the phase has ended and your opponent will not be allowed to open the file.

E-Mail Games

E-mail games are secured using the User Handles on the Multiplayer Screen. If you, for example, make the mistake by not END PHASING your last turn and sending the file to your opponent, your opponent should be not allowed to open the file. Just remember to always END PHASE after finishing a Movement Phase (as the Axis Player), and the Planning Phase (as the Allied player) before sending the file to your opponent.

The Replay Feature



At the bottom of the Allied Briefing or Axis Movement Phase tabs, appears a button labeled "Replay Turn" after the first Reaction Phase has been played Click this button to view a replay of the last Reaction Phase. This is an especially useful function for the Allied player in multiplayer games, as he may wish to "see" how his raids performed. You may click this button at any time. The functions under replay are as follows:

Start Replay: Click this button to start the replay.

Stop Playback: Click this button to stop the replay.

Playback Message Level: Click this button repeatedly to set the message level for the replay.

Backup Frames: Underneath the buttons are three backup buttons. These are inactive during actual replay. However, when the replay is stopped, it can be "backed up" to an earlier moment in the game. The game treats the replay as a "movie" of the Reaction Phase, so you can click these buttons to back up the replay by "frames" and then start the replay again.

Forward Frames: Underneath the buttons listed above are three forward buttons. Like the backup buttons, they're inactive when replay is running, but can be used to "fast forward" the replay after it's been stopped.

V. PLAYING THE GAME

Effective play of *TalonSoft's 12 O'Clock High: Bombing the Reich* requires patience and study. For the Allied player to be successful, he must bomb Axis targets again and again, send recon aircraft over targets to get good damage assessment photos, and consider spreading out his attacks to stretch the Axis defenses to their breaking point. On the other side, the Axis player must deal with a swarm of Allied raids that never seem to end. He must consider when and if to re-deploy anti-aircraft (AA) guns, balloon barrages and fighter squadrons, and must also make the calculated (though terrible) decision to allow certain areas of his country to go undefended in order to conserve his resources and protect more strategically important areas. All of these considerations and challenges face you in this game, and the mastering of these elements takes time. This chapter and the following sections describe how to play the game.

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Game Phases

The game of *TalonSoft's 12 O'Clock High: Bombing the Reich* is divided into a series of phases. For each day of a campaign, the Axis player has a **Movement Phase** and a **Reaction Phase**. The Allied player has a **Raid Planning Phase, a Reaction Phase**, and an **Intelligence Briefing Phase**. We'll begin by describing the Axis phases.

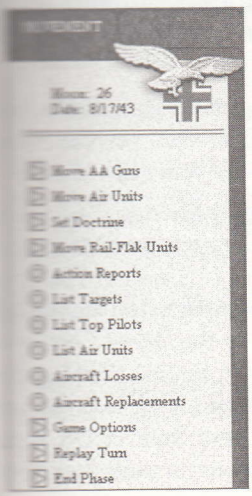
Axis Movement Phase

In the Axis Movement Phase, the Axis player has the opportunity to review the damage of the day's bombing missions against his country. He may also review the number of planes lost per side, the quality and condition of his pilots, and also move anti-aircraft guns, balloon barrages, and fighter squadrons (or "units") to other airfields/targets respectively, in order to bolster defenses in areas he considers weak. At the beginning of a new campaign, the information included in the Movement Phase is sparse, as the campaign hasn't started yet. As the campaign progresses, however, more and more information is added, so it is important for the Axis player to review the information carefully and note changes.

Command Highlighting:

During your Movement phase, you may now click on any HQ shown on the map. When selected, all attached airfields and subordinate commands highlight in blue. This is helpful information, because it shows you which commands are defending which areas of your country.

Axis Movement Phase Tab



Move AA Guns (and balloon barrages): Selecting this option gives you the opportunity to review your AA gun and balloon barrage resources, and then move them to other locations if desired. Unlike moving aircraft (see below), AA guns and balloon barrages are moved to and from a pool of available pieces, and then from this pool they can be transferred to other locations. To move AA guns and balloon barrages from place to place, follow these steps:

(1) *Select "Move AA Guns" on the Movement Phase tab.* This places you in the Move AA mode. All locations that currently contain ground defenses highlight.

(2) Once you've done this, you are prompted to "Move AA Guns-Ba a Location" on the bottom tab. *When this prompt appears, move the m arrow over the location on the map you wish to move AA guns and/or ball to, and left-click.* The location's details tab opens. Once you're on the de tab, you may move guns/balloons in and out of the location by clicking the appropriate arrows. **Note**: You may also select a location by clicking the "List" tab which appears at the bottom. Doing so places you in a li target types, which you then sort through to find the particular location wish.

Kugelfischer — ball bearings factory

size 40 damage 0
capacity 28 com-damage 0

	TYPE	+10	+1	-1	-10	POOL	TRANSIT	MOVE COST
10	AA Machinegun	«	<	>	»	905	0	1
20	20mm AA Gun	«	<	>	»	452	0	2
0	20mm quad AA	«	<	>	»	207	0	3
0	37mm AA Gun	«	<	>	»	126	0	4
16	88mm AA Gun	«	<	>	»	60	0	8
0	105mm AA Gun	«	<	>	»	33	0	12
0	Balloon Barrage	«	<	>	»	7	0	8

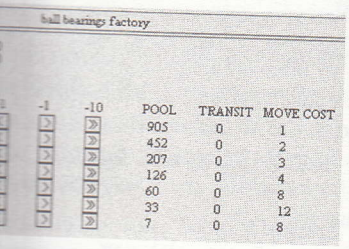
(3) *Click on the "+10" or "+1" arrows to move guns/balloons from the pool to the location. Click on the "-10" or "-1" arrows to move guns/balloons from the location to the "transit" pool.* See below for more details about the pools.

(4) Once you are finished moving AA guns and/or balloons in this location, *click the "Done" button in the bottom left-hand corner of the details tab.* Repeat steps 2, 3, and 4 until you are finished moving all AA guns and/or balloons around the map.

(5) When you are completely finished moving all AA guns and/or balloons, *click the "Exit" button on the bottom tab.* This exits you out of the Move AA Guns function completely and back to the Movement Phase.

Operation Points: Operation points are spent by the Axis player each time a gun/balloon is moved. At the beginning of each new Movement Phase, the Axis player is given a certain amount of Operation Points to spend moving guns, balloons, and air units (see below). The amount of Op Points spent moving these items is indicated in the "Move Cost" column. So, moving one balloon barrage costs 8 Op Points. Clicking the "Undo" button cancels all transfers you've conducted for the location you are currently working in. Once you've reached your limit in Op Point spending, you may not move any more guns, balloons, or units until your next Movement Phase.

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You may also select a location by clicking
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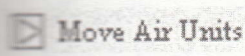
The "pool" and "transit" columns: When moving guns/balloons out of a location, they always first go into the "transit" pool and then a day later (the next Movement Phase), appear in the regular "pool" ready for redistribution. The "transit" pool basically serves to simulate (in an abstract manner) the time it takes to break down the guns/balloons at their location to get them ready for transfer. The regular "pool" represents all guns/balloons ready to be deployed. All new guns and balloons produced by the Axis economy during play appear immediately in the regular pool.

The Purpose of Transferring AA Guns and Balloons: As the Axis player, it's important to distribute your ground defenses as effectively as possible in order to hinder Allied bombing. The more guns/balloons you have in a location, the better defended that location is.

Each gun type has a fire range (i.e., the distance it can fire into the sky). The effectiveness of AA gunfire diminishes with altitude, so even though a 128mm AA gun reaches up to 32,000 feet, formations flying above those altitudes are less likely to get hit than those under 128mm gunfire at 15,000 feet. Balloon Barrages are extended on the end of cables that reach up to 4,000 feet. Allied raiders flying over targets with these ground defenses are more likely to be shot down, or run into the balloon cables. Thus, you'll want to keep an eye on which targets have (and do not have) ground defenses.

Review each campaign's victory and scoring conditions (p. 89) to see which targets are more likely to be targeted by Allied raids, then deploy your ground defenses accordingly. Take care, however, when placing balloon barrages around airfields, as any units you have attempting to land at those airfields could get caught in the cables.

General Production Rates for Axis Ground Defenses: Any Axis industrial locations which show production of ground defenses (marked ARM on target lists) produce AA guns and Barrage Balloons each day. The rate in which they produce these defenses depends upon how damaged they are. Severe damage to factories building AA guns and Barrage Balloons reduce defense production.



Move Air Units: Select this option to move air units from one airfield to another. To move a unit, follow these steps:

(1) *Select "Move Air Units" on the Movement Phase tab.* This places you in the Move Units mode. All airfields with air units highlight.

(2) Once you've done this, you are asked to "Select Airfield" on the bottom tab. When this prompt appears, *select the airfield on the map by left-clicking on it.* **Note**: You may also select an airfield by clicking the "List" tab which appears at the bottom. Doing so places you in a list of target types, which you then sort through to find the particular airfield you wish. Once you've selected the airfield, the bottom tab opens to reveal the details of the airfield you've selected, and you are prompted to "Select a group to transfer."

Deelen	primary airfield	attached to: Luftflotte 3
Stab/JG 1	FW 190A	37mm AA Gun 12
I/JG 1	FW 190A	20mm quad AA 9
Stab/NJG 1	He 219A	20mm AA Gun 36
		AA Machinegun 9

(3) On the airfield's details tab, *find the unit you wish to transfer and click on the button beside its name.* Some locations have more than one air unit (you may only choose one unit at a time for transfer). You are then prompted to "Select a new base."

(4) *Select the destination airfield (i.e., new base) to which you wish to transfer the unit.* The unit is then transferred to that new base.

(5) When you are completely finished transferring all units, *click the "Exit" button on the minimized bottom tab.* This places you back in the Movement Phase.

Transfer Time: The time it takes for the transferred air unit to arrive at its new base depends upon the distance between the two bases, so you may see a substantial delay before a transferred unit appears at its new base, although its name will appear at the location immediately. Transferred units automatically re-attach themselves under the group command where they are being transferred.

For example, a unit transferred from Luftflotte Reich to Luftflotte 2 is now under control of Luftflotte 2. The doctrine settings for that unit (see p. 38) are automatically changed to the doctrine settings of their new group. Operation points (see p. 34) used to transfer air units is one point per aircraft, but even if you only have one Op Point left, the entire unit will be transferred, but its transfer delay is increased dramatically to account for the lack of the needed op points.

The Purpose of Transferring Air Units: There are a number of reasons for moving air units around from base to base. One very good reason is to allow heavily engaged units (i.e., those that have flown a lot of missions) to rest. As a unit's pilots become fatigued (see p. 44), its combat effectiveness and morale go down. So, for example, swapping low morale Luftflotte Reich units with high morale Luftflotte 2 units is a good tactic to use to keep your readiness and attack quality high. Another good reason is to keep your opponent guessing as to where your units are. During a campaign, your opponent may be conducting recon missions to see where your ground defenses and aircraft are located. Re-deploying your units keeps your opponent off guard.

Another good reason to move air units is to respond to the various tactics your opponent may employ. For example, if during a campaign, you find that the Allies are sending a lot of low-level bombing groups with little or no fighter escort against areas protected by Luftflotte Reich, you may want to move more Me-109 units into the area, since these are very effective against bombers. You may also consider moving in FW-190s to thwart aggressive Allied fighter sweeps.

One important caution when moving units, however, should be noted. Each airfield has a "capacity." This capacity number is the number of units that that airfield can maintain comfortably. *Most airfields have a capacity of 4.* If the number of units at an airfield exceed the airfield's capacity, then those units will take longer to refuel and get back into combat. You may exceed the capacity of an airfield if you wish (and there may be reasons for you to do so), but just be aware of the danger.

Move Rail-Flak Units

Move Rail Flak: The Axis has a number of heavy AA guns deployed on railcars. These can be moved about somewhat more rapidly than fixed guns—but, of course, are restricted to rail lines. To move a Rail Flak unit, follow these steps:

(1) *Click on Move Rail Flak on the Movement Phase Tab.* The map will clear to highlight available rail flak units in blue.

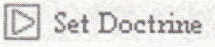
(2) *Click on the desired unit.* The map will redraw, and the bottom tab will display information about the unit.



(3) *If you wish to transfer it, click next to the unit name on the bottom tab.* Then click on the desired new location on the map (it must have a rail line, i.e. it should be an area with a positive rail number).

The bottom tab will indicate how many days (turns) are required before the unit becomes operational at the new location, while the right tab indicates how many "operation points" the move has cost you.

The Purpose of Transferring Rail Flak: Rail flak is extremely cheap to move, and therefore if necessary, you can make a lot of quick changes to the ground defenses of any target on the map, and still have enough Op Points remaining to make other moves. It's also an effective tactic to move rail flak to keep your opponent guessing as to where your heavy guns are located.



Set Fighter Doctrine: Select this option to change your fighter units' attack doctrine. There are five "Luftflotten" (corresponding roughly to Allied fighter groups): Luftflotte 2, 3, 4, Luftflotte Süd Ost (southeast), and Luftflotte Reich. Clicking on "Set Doctrine" brings up the screen for the Luftflotte corresponding to the current region shown on the map, but you may select any Flotte from the right tab.

Alert Level and Radius: Axis units have four levels of alert: 1 hour, 15 minutes, 5 minutes, and 1 minute (the highest level). The alert level is the time it takes a unit to get into the air after it receives orders to take off. The problem with keeping units on the highest alert level all the time is that their pilots become fatigued (see p. 44) while they are waiting for orders to take off. The game allows units to start each day on 1 hour alert, and then step up their alert level in reaction to Allied activity. When the Allied radio activity level exceeds 100, then all Axis units (except night fighters) go on 15 minute alert. Units go to higher levels of alert when detected Allied raids move within a radius that triggers a new level. The exception to this rule are night fighters. Night-fighter Me-109s, FW-190s, Me-110s, Ju-88s, and Do-217s do not go on higher alert when Allied raids are detected during daytime hours. They stay at their default 1 hour level until nighttime hours arrive, and can then go on higher alert status. This ensures that night fighter crews (who perform better at night and should be held in reserve and flown at night) do not become unnecessarily fatigued during the day. Alternatively, when nighttime arrives, daytime fighters such as "standard" Me-109s and FW 190s do not go on higher alert. They stay at the default 1 hour alert level.

Axis Interceptor Delay Time and the Game Clock: At around 17:30 in the afternoon, day-fighters begin standing down and their alert level begins to decrease to 63 minutes. Meanwhile, night fighters begin gearing up, and their alert levels begin increasing. This does not occur instantaneously; alert levels ramp up or down gradually as day and night changes.

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Rail Flak: Rail flak is extremely cheap
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d night changes.



Interception Tactics: Interception tactics are set by group and aircraft type. There are four tactics: (1) direct-fighter, (2) bounce-fighter, (3) direct-bomber, and (4) bounce-bomber.

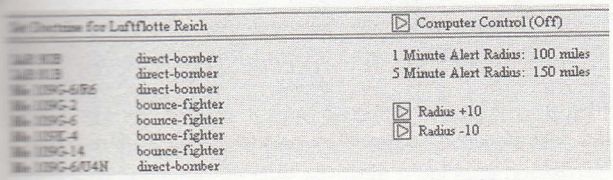
Squadrons assigned **tactics 1 or 2** will have a preference for attacking enemy fighters, while those with **tactics 3 or 4** will try to attack enemy bombers.

Squadrons assigned **direct tactics** will go straight-in to attack enemy formations without wasting any time.

Squadrons assigned **bounce tactics** will maneuver into the best possible attack position. Bounce tactics may be more effective against the enemy, but usually require more time to maneuver into position, and sometimes enemy escort fighters will attack during this interval.

To set fighter doctrine, follow these steps:

(1) *Select "Set Doctrine" on the Movement Phase tab.* This places you in the Set Doctrine mode. The bottom tab opens and defaults to the Luftflotte in the current map area. The Movement Phase tab refreshes to show you all five Luftflotten.



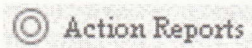
(2) *Select your Luftflotte from the Movement Phase tab, then set (by aircraft type) your fighter doctrines for that Luftflotte.* Once you've done so, each squadron of that aircraft type (in that Luftflotte) will follow that doctrine.

(3) *Repeat step 2 until you are finished setting the doctrine for each Luftflotte, then click "Exit" on the Movement Phase tab to exit back to the Movement Phase.*

The Purpose of Changing Fighter Doctrines: At the beginning of each new campaign, the game assigns a doctrine to each of your units based on historical performance. For example, your FW 190 units may be set to intercept Allied fighters. If, however, you find that your Allied opponent is sending heavy bomber raids (with light fighter escort), you may wish to reassign your FW 190 units to either bounce-bomber or direct-bomber.

It's important to note, however, that even though a fighter is assigned a particular attack doctrine, that doesn't mean it won't attack a different aircraft type if you order it to do so, or if it finds itself in a situation where no other target exists. For example, if you order FW 190s to attack a group of B-17 bombers, the units will do so, even though they may be set to direct-fighter tactics. Once these 190s get into the area of the bombers you've ordered them to attack, if there are P-51s in the vicinity, they will ignore the bombers and go after the fighters because of their doctrine setting.

You must also keep in mind that there is a certain amount of randomness built in as to how your fighters will react during interception. The skies can get very cluttered, and so your units will first choose targets based on their doctrine setting, and then choose targets based on what's in the area at the time of interception.



Action Reports (information-only tab): Select this option to review all the raids against you for the day and their results.

R#	mission	ftr	bmr	f/lost	b/lost	i/lost	tgt type	target	rdam	cdam	sdam
1	BOMB	53	82	0	0	0	RAIL	Ghent	11	0	54
2	BOMB	58	92	1	0	4	AF	Beaumont	0	0	7
3	BOMB	0	43	0	26	0	RAIL	Orleans	9	0	6
4	BOMB	178	121	0	3	0	RUBBER	Leverkusen	99	14	0
5	BOMB	78	129	0	0	0	POWER	Lunen	99	4	0
6	BOMB	0	102	0	18	0	FUEL	Rhenania	51	0	0

#: This is the raid ID number assigned to the raid by the Allied player. This number is not associated with the raid ID numbers which your radar command assigns to raids as they are detected. Basically, this is just a numerical list of the raids in the order the Allied player planned them.

Type: This is the raid type. There are four different Allied raid types: Bombing (Bomb), Fighter Sweep (FS), Reconnaissance (Recon), and Night Intruder (NI). For more information about these raids, see p. 70.

Ftr: This number represents the total number of fighter planes in the raid.

Bmr: This number represents the total number of bombers in the raid.

F/Lost: This is the number of estimated fighters destroyed in the raid.

B/Lost: This is the number of estimated bombers destroyed in the raid.

I/Lost: This is the number of Axis fighters (i.e., your aircraft) that were destroyed while attacking during a raid. For the Allied player, the number here is an estimate of Axis aircraft destroyed.

Tgt Type/Target: This is where the raid attacked. This information shows what kind of target it was the location name. For more information about targets, see p. 105.

Rdam, Cdam, Sdam: The "rcs" numbers represent the damage the target sustained from the raid. The letters mean different things for different target types.

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Reports (information-only tab): Select
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tgt type	target	rdam	cdam	sdam
RAIL	Ghent	11	0	54
AF	Beaumont	0	0	7
RAIL	Orleans	9	0	6
RUBBER	Leverkusen	99	14	0
POWER	Lunen	99	4	0
FUEL	Rhenania	51	0	0

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"rcs" numbers represent the damage the
aid. The letters mean different things for

Other airfield targets: **R**=Runway damage, **C**=Communications damage, **S**=Service area damage. **Note**: Damage to the runway **(R)** is easily repaired, and so you shouldn't be too concerned with high **R** damage against airfields although there is a risk of your aircraft crashing on a heavily damaged runway. Damage against an airfield's communication and service areas is important because it reduces that airfield's ability to maintain unit readiness. *See* p. 89 for more details about victory points and damage to your targets.

Other radar targets: **R**=Radar damage, **C**=Communications damage.

Urban areas and rail yard targets: **R**=Urban damage, **S**=Rail yard damage.

Factories and all others: **R**=Damage to Factory/Installation, **C** = Communications damage. In the case of factory communication damage, this does occur sometimes when a factory is hit. Severe damage to the communication facilities of factories means that that factory cannot report raid sightings.

Note that the Action Report may contain inaccuracies, particularly when referring to the opponent. (This holds true for both Allies and Axis forces and reports.) For example, your own aircraft loss figures reflect combat losses only, while not including operational losses (landing damage, damaged on ground, etc.). Reports of the opponent's losses, however, include all losses—and, since they're based on claims from your pilots, they may be significantly inflated.

Similarly, for the Allies, Action Reports of target damage may not be correct until verified by subsequent reconnaissance photos. For Axis players, however, reports of damage to their own targets (airfields, industry, etc.) are accurate.

The Purpose of Reviewing The Action Report: The importance of reviewing the Action Report is obvious: As the Axis player, you need to know where the Allies are attacking. And, you need to know which targets are getting hit the most. Depending upon which campaign you are playing, the Allies will attack targets based on their needed victory requirements (see p. 89), and so you should review the Action Report carefully to see how much damage your targets are taking, and where the thrust of the attack is occurring. Once you take a full assessment of the damage, you can then make better decisions on where to move your AA guns and balloon barrages, or air units, and what attack doctrines to set.

List Targets

List Targets (information-only tab): Select this option to review details about your industries and airfields. Upon selecting this option, the tab refreshes to show you the full list of target types.

Pick Type of Target	Total	Damage
area	1009	3
radar site	208	0
primary airfield	2772	0
aluminum factory	568	0
oil storage	936	0
oil refinery	1406	0

The number under "total" represents the total effective value for that target type (i.e., the total undamaged capacity of that industry). It is adjusted downward for damage to other industries on which it is dependent (see p. 90). The number under "damage" is the percentage of the total capacity that has been damaged.

Once you've reviewed this information, if you wish to review specific target damage, click on a target type. The specific targets of that type appear.

Target List

Name	damage	capacity	AA guns	balloons
Kugelfischer	0	28	46	0
Vereinigte #1	0	14	48	0
Steyer	0	12	41	18
Vereinigte #2	0	10	38	0

Name: This is the name of the target (*e.g.*, Kugelfischer).

Damage: This is the percentage of damage to the target, broken down in three damage categories (if airfields), two damage categories (if radar sites), and only one category for any other target type. If the target has sustained damage, it will be listed here. The damage amounts listed here are always correct for the Axis player.

Air Units/Capacity/Size: This number represents the production capacity or size of the target. For factories and other industrial targets, this represents the production capacity; for rail yards, this represents the size/importance of the yard; for airfields, this represents the number of air units the base can comfortably maintain. *Most airfields operate normally with 4 units.* You may over-stack an airfield if you wish (i.e., have three squadrons at a secondary airfield), but the effectiveness of that airfield to get aircraft ready to fly is reduced.

AA Guns: This is the number of anti-aircraft guns currently located at the target.

Balloons: This is the number of balloon barrages currently located at the target.

Attached To: If you are reviewing a list of airfields, the Luftflotten that controls the airfields are listed here.

If you wish to view even more information about a target, *select the target name, then click on the "details" tab and the information below appears.*

Target Details

Kugelfischer	ball bearings factory		
size	40	damage	0
capacity	28	com-damage	0
com-delay	3		
AA Machinegun	x 10		
20mm AA Gun	x 20		
88mm AA Gun	x 16		

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pacity of that industry). It is adjusted down
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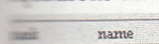
damage	0
com-damage	0

The target "details" display gives you all the details of the target. It shows the target name, which air group or primary airfield to which it is attached (if an airfield), what kind of target it is, its size, capacity, and other important information. Also included are the following:

Com-delay: This number represents the additional delay in communications caused by the time required to transmit orders through the chain of command. This may be increased by damage to communications facilities at airfields or radar stations. The com-delay number of an airfield is directly connected to the amount of time it takes for a unit of that airfield to get off the ground. For example, if the alert level (see p. 38) of a unit is set to 60 minutes, and if its airfield has com-delay damage of 15, it will take 75 minutes for that unit to get off the ground once it's ordered to launch.

Com-damage: This number represents the percentage of damage done to communications. Like the com-delay number, com-damage increases a unit's delay for launch. Once you are in a target's details tab, you can select any squadrons which appear there (if an airfield) and open the "unit" and "pilots" tab (see p. 47).

The Purpose of Reviewing Target Information: It's absolutely necessary for the Axis player to conduct good damage assessment in order to decide how to prosecute his defense. You must know which airfields are being heavily attacked (so that you can decide whether to move their air units to other, less-damaged fields). You must know which industries are being pounded to dust in order to decide when and where to move AA guns and balloon barrages. Reviewing the target list, then, is one of the most important tasks you will perform in the Movement Phase. Your skilled opponent will conduct his attack based on what he needs to do to score points for victory. Review ***Bombing the Reich's*** victory conditions (see p. 89) carefully to know which industries will be targeted most often. Although there are various visual preferences you can set to see how much damage a particular target has sustained (see p. 18), you still need to review the Target List often to fully understand how much damage your poor (yet brave) country is taking.



List Top Pilots (information-only tab): Select this option to review a listing of your top pilots. As the campaign progresses, the game begins to promote pilots and adjust their attributes. Units with good pilots perform their duties better, so it's important to review your pilot information often and know which squadrons have the top guns.

unit	name	exp	fat	mis	kills	fate	unit	nat	type
Fw	V.Stolz	72	10	2	2	---	II/JG 1	German	FW 190A-8/R2
Fw	T.Herschberger	80	10	2	1	---	II/JG 1	German	FW 190A-8/R2
Fw	U.Steiner	72	0	2	1	KIA	II/JG 1	German	FW 190A-8/R2
Fw	A.Junger	66	10	2	1	---	II/JG 1	German	FW 190A-8/R2

Pilot Rank: This is the pilot's rank.

Pilot Name: This is the pilot's name. Nearly every pilot (both Axis and Allied) who flew during these campaigns is in the game's extensive database.

Experience (exp): This number represents the pilot's experience. A pilot gains experience by flying his aircraft, by killing enemy aircraft, and for successfully bombing targets.

Fatigue (fat): This number represents the pilot's fatigue level, expressed as a percentage of reduction from optimum performance. For example, a pilot with a fatigue level of 25% performs at only 75% of his capabilities. This provides a useful way of comparing two pilots' capabilities at any time—*i.e.*, in a dogfight, given similar planes, the less fatigued pilot will probably win. Similarly, less-fatigued bomber pilots will be more accurate, etc.

Fatigue levels are calculated on a sliding scale based on the following "point system:"

Category	Points
1 hour alert	0
15 minute alert	1 (per minute)
5 minute alert	2 (per minute)
1 minute alert	3 (per minute)
Flying through flak	10 (per instance)
Dogfight	30 (per instance)
Fighter pilot attacking bomber	10 (per instance)
Bomber pilot attacked by fighter	10-30 (per instance)
Each minute flying	10 (per instance)
Landing	100 (per instance)
Low Altitude and Low Light Fatigue:	In addition to the fatigue generated above, pilots may also gain fatigue by flying below 1,000 feet and in low levels of light (usually at night). For low level flying, if a random number generated between 0 and 1,000 is greater than the pilot's current altitude, the pilot receives 2 fatigue points. For night flying, if a random number generated between 0 and 100 is greater than the light level (see p. 51), the pilot receives 1 fatigue point.

Any time a pilot's fatigue *points* exceed his current fatigue level by 10, his level increases by 1%. At the same time, his fatigue points are reduced by the amount required for the most recent fatigue level increase. After the conclusion of the current phase, when it's assumed the pilot will get a night's rest, his fatigue *level* is divided by four (and rounded down to the nearest whole percent).

For example, if a pilot has a Fatigue Level of 25, and during the Reaction Phase, he has accumulated 39 fatigue points, then his Fatigue Level goes up to 26. At the same time, his Fatigue Points are set back to 4. It would now require an additional 36 Fatigue Points to bring his Fatigue Level up to 27; if he then gets a night's rest, his Fatigue Level would drop back to 6 (27 / 4, rounded down).

(mis): This number represents the number of missions the pilot has flown.

This number represents the number of enemy aircraft the pilot is credited with shooting down. Only pilots with one kill or more are considered "top pilots."

This applies only to pilots who are currently or permanently unable to fly. There are three fate types:

wounded in action (this pilot may return later). During play, if a pilot is wounded and you have the appropriate message level turned on, a number in parenthesis appears next to the word "WOUNDED". This number indicates the number of days the pilot will be out of commission.

missing in action (in game terms, this is the same as KIA). MIA is more likely to happen to Allied pilots because they fly over enemy land.

killed in action.

This is the unit to which the pilot is assigned. You cannot reassign pilots to other units. They stay with their assigned unit for the entire game.

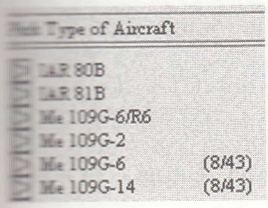
This is the pilot's nationality.

This is the type of aircraft the pilot is (or was) flying.

The Purpose of Reviewing Top Pilots: Units with top pilots fly better interception missions. Thus, knowing which units have top pilots, helps you decide which to "scramble" against incoming raids. Many of the pilots used in the game are actual pilots who flew in the European Theatre, so there's certainly interest here for those players who are familiar with the history and recognize certain names.



List Air Units (information-only tab): Select this option to review your fighter units. The information displayed here shows your units' morale levels, damage levels, etc.



The first tab that opens lists the aircraft types (Me 109, FW 190, etc.). This is a list of all the aircraft that are (or potentially will be) flying in the campaign you are currently playing. *If you wish to review a list of all units of that aircraft type, select a specific type*. A list of all units using that aircraft appears (see below). It's important to note that you may see an aircraft type listed here, click on it, and get no response. This means that that particular aircraft type is not currently being used in the campaign, so no units have them at this time.

Unit List

Unit List	attached to	ready	unavail	exp	morale	base
III/JG 54	Luftflotte 3	30	15	68	99	Schipol
II/JG 3	Luftflotte Reich	28	8	77	77	Neersen
I/JG 3	Luftflotte Reich	33	7	72	72	Dusseldorf
II/JG 27	Luftflotte Reich	35	5	69	81	Trier
JGr S0	Luftflotte Reich	30	6	64	83	Trier

Unit List: This is the name of the unit.

Headquarters: This is the headquarters to which the unit is attached.

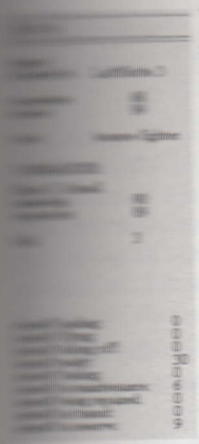
Ready: This number represents the number of individual planes in the unit which are ready to take off. The pop-up information box, which appears for the Axis player as he moves the mouse over an airfield, shows the number of "ready" aircraft for the units stationed there. Thus, if you are scrolling the mouse over an airfield and see that a unit there has zero (0) aircraft, that will mean that that unit does not currently have aircraft ready to launch (i.e., they are either already in the air or are not operational). These numbers fluctuate up and down according to the circumstances in the Reaction Phase.

Unavailable: This number represents the number of individual planes in the unit which are unable to fly. The four unavailable conditions are: (1) damaged (being repaired), (2) in maintenance, (3) moving from one base to another (in-transit), and (4) in reserve or without pilots.

Experience: This number represents the average experience of all pilots in the unit. The higher the unit's experience, the better it will perform.

Morale: This number represents the unit's willingness to press on in the face of enemy opposition and high losses. A unit's morale is reduced when its aircraft are destroyed, or pilot fatigue is high (see p. 44). A unit's morale is increased due to inspiring leadership, and by successfully bombing targets (for Allied pilots) or destroying enemy aircraft. Whenever an Axis airfield is attacked (by bombing or strafing), the game goes through a routine of determining if on-ground aircraft are damaged.

For each aircraft damaged, the game determines whether or not the unit's morale is affected. It makes the determination as soon as the aircraft is damaged. Also, if those aircraft are in a very high alert state, the pilot of the aircraft may be wounded or killed, and that too may drive down unit morale. In addition, any damage to the service area of an airfield adversely affects unit morale. And Axis units suffer additional morale losses during the overnight phase, if the airfield's service area has taken damage. The higher the damage, the higher the morale loss.



The Unit Tab. The Uni
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all its aircraft. There are
landing, flying, taking o
being repaired, in transi
tus changes constantly

Aircraft Damage Repair Rates: The ra
proportional both to how badly it was da
are available. Service areas are the parts
repaired. If these have been heavily damage

The Pilot Tab. The Pilot Tab lists the
of the squadron. It shows the pilot's rank,
number of missions he has flown, his number o

unit	name	exp
Fullerebel	J.Schaub	64
Fullerebel	K.Kessler	58
Fullerebel	L.Rittenhaus	57
Fullerebel	M.Wagner	63
Fullerebel	N.Dahl	67
Fullerebel	O.Schirmer	68

The Purpose of Reviewing Air Units:
of your air units to see which are taking hea
and which have highly skilled or heavily fa
mation will help you decide which units to
to areas with less activity, or which units are

Unit List

ready	unavail	exp	morale	base
30	15	68	99	Schipol
28	8	77	77	Neersen
33	7	72	72	Dusseldorf
35	5	69	81	Trier
30	6	64	83	Trier

e unit.

uarters to which the unit is attached.

he number of individual planes in the unit
op-up information box, which appears for
house over an airfield, shows the number
ioned there. Thus, if you are scrolling the
a unit there has zero (0) aircraft, that will
rently have aircraft ready to launch (i.e.,
or are not operational). These numbers
g to the circumstances in the Reaction

ents the number of individual planes in
The four unavailable conditions are: (1)
aintenance, (3) moving from one base to
erve or without pillows.

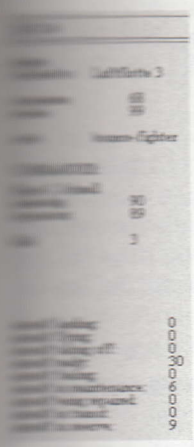
s the average experience of all pilots in the
e, the better it will perform.

e unit's willingness to press on in the face
ses. A unit's morale is reduced when its
ue is high (see p. 44). A unit's morale is
ip, and by successfully bombing targets
my aircraft. Whenever an Axis airfield is
), the game goes through a routine of
re damaged.

he determines whether or not the unit's
rmination as soon as the aircraft is dam-
very high alert state, the pilot of the air-
d that too many drive down unit morale.
vice area of an airfield adversely affects
r additional morale losses during the
vice area has taken damage. The higher
loss.

Base: This is the airfield on which the unit is based. This can change if the unit is transferred to another airfield during play.

After you have reviewed a list of air units, you may select one individually to examine more details. Once you've selected the unit, click the "details" tab. The "unit" and "pilot" tabs appear.



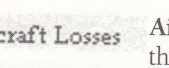
The Unit Tab. The Unit Tab lists full details about the squadron you have selected. The unit tab lists the unit's name, its experience (an average of its pilot skill) and morale (a compilation of the unit's success or failure in the past), its current attack doctrine, its commander and his leadership (which helps low-experienced pilots gain experience) and inspiration (affects the adjustment of the unit's morale between Reaction Phases), and the status of all its aircraft. There are nine status categories for aircraft: landing, flying, taking off, ready, fueling, in maintenance, being repaired, in transit, in reserve. A unit's aircraft status changes constantly during play.

Aircraft **Damage Repair Rates:** The rate at which an aircraft is repaired is proportional both to how badly it was damaged and what service facilities are available. Service areas are the parts of airfields where aircraft are repaired. If these have been heavily damaged, repairs will take longer.

The Pilot Tab. The Pilot Tab lists the details about each pilot currently in the squadron. It shows the pilot's rank, name, experience, fatigue, number of missions he has flown, his number of kills, and nationality.

rank	name	exp	fat	mis	kills	nat
Feldwebel	J.Schaub	64	9	2	0	German
Feldwebel	K.Kessler	58	9	2	0	German
Feldwebel	L.Rittenhaus	57	9	2	0	German
Feldwebel	M.Wagner	63	9	2	0	German
Feldwebel	N.Dahl	67	9	2	0	German
Feldwebel	O.Schirmer	68	15	2	0	German

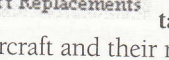
The Purpose of Reviewing Air Units: It's important to review the status of your air units to see which are taking heavy losses, which have low morale, and which have highly skilled or heavily fatigued pilots. Knowing this information will help you decide which units to rotate out of their current airfields to areas with less activity, or which units are getting the most enemy kills, etc.



Aircraft Losses (information-only tab): Select this option to review all the aircraft that have been destroyed (on both sides) for the day's raids and for the entire campaign. Two numbers are displayed for each aircraft type. The first number (under the "total" column) is the total aircraft losses for the entire campaign. The second number (under the "today" column) is the total aircraft losses for the day. To the right is listed the total sorties both sides have flown for the day and for the entire campaign, and also total aircraft losses. Unlike the Action Reports, these figures are accurate for both sides.

The Purpose of Reviewing Aircraft Losses: For obvious reasons, knowing which aircraft are suffering the most losses will help you decide if current attack doctrine is effective. For example, if you're losing a lot of Me 110s and you have all of them set on direct-bomber tactics, this probably means that enemy fighter aircraft are not being fully engaged, and are thus more effective against you. You may wish to change your tactics to compensate.

Very likely, you'll lose more Me 109s during play than any other aircraft. This is not unusual for the Axis player, as there are more Me 109 units than any other. Don't be too concerned about Me 109 losses unless, of course, they grossly exceed available Me 109s in the replacement pool (see below).



Aircraft Replacements (information-only tab): Select this option to review a listing of all Axis aircraft and their replacements. Two numbers are displayed for each aircraft type. The first number (under the "total" column) is the total number of replacement aircraft that have been produced during the campaign. The second number (under the "pool" column) is the number of aircraft that have not yet been distributed to the squadrons. These numbers change as the campaign progresses.

Aircraft	total	pool
IAR 80B	0	0
IAR 81B	2	0
Me 109G-6/R6	25	11
Me 109G-2	5	0
Me 109G-6	54	29
Me 109K-4	0	0
Me 109G-14	16	14
Me 109G-6/U4N	2	0
FW 190A	30	7
FW 190D	0	0

The Purpose of Reviewing Aircraft Replacements: Keeping tabs on aircraft replacements is useful, if you want to see how quickly aircraft are being replaced. As play progresses, your aircraft production centers add new planes to your replacement pool. These replacements are pulled out of the pool during play to fill holes in Axis units where necessary. If, for example, the replacement pool number (second number) for Me 109s is zero (0), it means that the minute a new 109 rolls off the assembly line, it's being assigned as a replacement.

me

es (information-only tab): Select eview all the aircraft that have been raids and for the entire campaign. rcraft type. The first number (under losses for the entire campaign. The lumn) is the total aircraft losses for orties both sides have flown for the lso total aircraft losses. Unlike the ate for both sides.

raft Losses: For obvious reasons, g the most losses will help you ective. For example, if you're los- of them set on direct-bomber tac- fighter aircraft are not being fully against you. You may wish to

09s during play than any other xis player, as there are more Me o concerned about Me 109 loss- ceed available Me 109s in the

placements (information-only his option to review a listing of . Two numbers are displayed for under the "total" column) is the hat have been produced during nder the "pool" column) is the en distributed to the squadrons. n progresses.

ose of Reviewing Aircraft nts: Keeping tabs on aircraft s is useful, if you want to see how raft are being replaced. As play your aircraft production centers anes to your replacement pool. ements are pulled out of the pool to fill holes in Axis units where , for example, the replacement (second number) for Me 109s is eans that the minute a new 109 ssembly line, it's being assigned ent.

Knowing that a certain aircraft is not being manufactured quickly could give you an incentive to not scramble units of that type for awhile in order to replenish the pool.

Upgrades and the Replacement Pool: During a campaign, some units begin to upgrade their aircraft. The older aircraft are not scrapped; they are simply rotated into the replacement pool to be used by other units which have not fully upgraded.

End Phase

END PHASE BUTTON: *When you are finished with your Movement Phase, press the "End Phase" button to enter the Reaction Phase.*

The Reaction Phase

The Reaction Phase is where it all happens, where Allied raids are launched, and where the Axis player may "react" to incoming raids by setting up patrols and interceptors. While the Allied player simply sits back and watches his raids perform their missions (which he has plotted during the Raid Planning Phase, see p. 64), it is the Axis player who must rise to the occasion in the Reaction Phase.

Full Screen

Mode: During this phase, a full-screen display is available; it's toggled on and off by the lowest button on the toolbar. Most other buttons remain available, as does the mini-map. The screen can be toggled back to the normal display (with functions available on the right and bottom tabs) at any time. Switching to the full screen displays all pertinent game information in a modified top information bar.



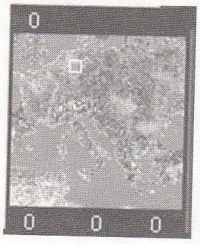
Playing on the full screen: While playing the game on the full screen, you may click on the "message level" and "clock speed" displays to change them. Also, if you wish to perform any duties, such as setting patrols or launching interceptors, you may select the Hot Key (see p. 113) corresponding to the function or right-click anywhere on the map. Selecting the hot key automatically puts you into that function; right-clicking on the map opens a small window displaying all the Reaction Phase functions (see details about the functions below). Once this window appears, you may select options normally as if you were playing the game with the tabs displayed. Once in the selected function, the tabs appear momentarily for you to perform the function, and then when you exit the function, the full map appears again.

It is highly recommended that you play the Reaction Phase in the full screen mode. In most campaigns the map area is vast, so seeing more of the map at one time is advantageous. It's also more attractive, particularly if you are playing with 3D aircraft toggled on. And, to play the Reaction Phase as smoothly as possible, we recommend learning your Hot Keys (see p.113).

Playing the Game

IMPORTANT NOTE: While playing in the full screen, it's easy to forget that the game is paused since the phase functions are not always displayed to the right. To ensure that the Reaction Phase is progressing, Click the "C" button to CONTINUE, or right-click on the map to display the current status.

START **THE "START/STOP" BUTTON:** The Reaction Phase begins in a "paused" state. This allows you to review the map (if desired) before the phase begins. *To start the Reaction Phase, click the START button.* When depressed, the start button becomes the STOP button. *To stop the Reaction Phase, click the stop button.*



Radio Activity: While they are forming up, Allied units generate radio activity that grows until all raids are ready to launch. As radio activity increases, the numbers *in the top and bottom black bars of the mini-map* increase to give you a visual representation of the amount of activity occurring among the Allies in that area. For each count of 50, figure at least one raid is forming. As the raids actually get underway, the amount of radio traffic will decrease again.

Radio Activity and Patrols: One thing you'll want to do frequently, as the Axis player, is launch patrols once radio activity begins increasing dramatically. Launching patrols can help get your units in position to spot and intercept Allied raids. *For more information about how to set patrols, see p. 55.*

Allied Aircraft Flying Under Radar, Recon Aircraft, and Night Intruder Aircraft: Allied aircraft flying under radar (below 500 feet) generate radio activity; however, they are not detected on radar. Recon aircraft, on the other hand, do not generate radio activity, nor do night intruder aircraft. These types of raids will often just appear above their targets, take their recon photos or drop their bombs, and quickly fly home. There isn't a lot you can do about these particular raiders, save for anticipating their arrival and have enough ground defenses in place to hit them when they do arrive.



Cloud Cover (overcast):

Cloud Cover: 7% at 1100 ft.

The overcast level represents the average density of cloud cover over the map. Cloud cover greater than 69 represents hostile weather that may damage aircraft during flight. Overcast may prevent bombers from visually locating their targets, or may hinder the ability of fighters to locate and attack bombers. Higher cloud cover levels may also increase the number of landing accidents. During the Reaction Phase, it's important to watch the cloud cover level carefully and launch (or not launch) interceptors accordingly.

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s may also increase the number of land
Phase, it's important to watch the cloud
not launch) interceptors accordingly.

The actual cloud graphic appearing over land areas on the map is
cloud cover is currently in effect. This is particularly problematic
the Allied player, as dense cloud cover may prevent him from finding
targets. Also note that clouds will drift during the day (generally from
northwest to southeast), so areas not previously covered in clouds at the
beginning of a Reaction Phase may be covered at the end. As you scroll
through the cloud cover figure in the information bar will change to indi
cate the current level.

The display of cloud cover can be toggled on and off to make it easier
to see the map. The *effects* of cloud cover, however, are always present.

The cloud cover number (seen on the information bar) gives cloud
coverage as a percentage, and cloud base in hundreds of feet. For exam
ple, "75% at 1200 feet" would indicate that clouds begin at 1200 feet
above the ground, and their tops are 1500 feet higher; airplanes flying at
or above 2700 feet are in the clear. Bombs dropped from above the
clouds tend to be very inaccurate. On the other hand, it's difficult for
fighters to locate bombers flying within the clouds.

Pathfinder Units and Cloud Cover: The Allied player has a number of
B-17 and B-24 Pathfinder units. These units, while small, are ideal "lead"
units on days with high cloud cover, as they are better able to find targets
through heavy clouds. To learn more about Pathfinder units, *see p. 75.*

Cloud Cover and Raid Delay: Severe cloud cover over form-up air
fields may delay Allied units from launching. If this happens, the Allied
player receives a message during play (if the message level is on) telling
him that a unit has been delayed due to poor weather. As soon as the raid
is ready to launch, the game determines the cloud density over the form
up airfield. If there is no visibility, the entire raid (or a portion of it – usu
ally escorts) may be delayed from taking off. In addition, the entire raid
may be scraped if the game feels that the overall cloud cover percentage
of the map is not likely to improve.

Light: 0 **Moon: 26** **Light and Moon:** The light number rep
resents sun or moonlight. When the sun
is up, light is 100. After the sun sets, light is reduced to the moonlight
level. During a full moon, light will never be less than 28. During a new
moon, light will be reduced to zero. Night conditions exist whenever light
is less than 50. Lower light levels reduce the range and the chance of visu
ally detecting aircraft, as well as the accuracy of aircraft navigation to and
on target areas (thus also adversely affecting bombing accuracy). And,
finally, lower light levels increase the likelihood of aircraft crashing
during landings.

Moon Rise and Set: These numbers dictate periods of total darkness on the map and this makes navigation and siting more difficult.

Campaign time and date: ***TalonSoft's 12 O'Clock High: Bombing the Reich*** offers the player various campaigns, reflecting different stages in the air war against the Axis. These include:

The Strategic Bombing Campaigns

Introductory Scenario: [1 turn]
Nachtjagd I: [8/22/43 - 10/2/43]
Nachtjagd II: [2/16/44 - 4/4/44]
Nachtjagd III: [7/16/44 - 8/26/44]
Big Week [2/20/44 - 2/26/44]
Oil Offensive I: [6/6/44 - 6/12/44]
Oil Offensive II: [6/16/44 - 7/27/44]
Full Campaign 43: [700 turns]
Full Campaign 44: [500 turns]
Jet Age 44 [500 turns]

The Ground Support Campaigns

Avalanche: [8/17/43 - 10/15/43]
Overlord I: [5/1/44 - 8/31/44]
Overlord II: [6/4/44 - 8/31/44]

Note: For more details about these campaigns, see p. 92.

Date: The current day of the campaign. Note that one-day and one-week campaigns last for their full allotted limits. One-month and full-length campaigns, however, last for the full time limit or until the Allied player achieves victory, or until the game stops due to monthly score checks (see p. 92).



Time: The time represents military (24-hour) time. When you click the "Start" button to begin or resume a Reaction Phase, the clock starts and continues until either you have halted the Reaction Phase or the phase ends.

How Long Does a Reaction Phase Last? A Reaction Phase lasts until all raids and/or patrols are completed and no planes are left flying. This may stretch the Reaction Phase well into the next day. Once the Reaction Phase ends, a new Axis Movement Phase begins, and the process starts once again.

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Soft's 12 O'Clock High: Bombing
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/43 - 10/2/43]
/44 - 4/4/44]
6/44 - 8/26/44]
- 2/26/44]
6/44 - 6/12/44]
6/16/44 - 7/27/44]
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/43 - 10/15/43]
/44 - 8/31/44]
/44 - 8/31/44]

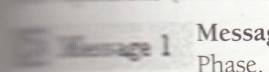
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and no planes are left flying. This
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hase begins, and the process starts

Time and Light: The time of day and the light number are interconnected. Notice that the time-of-day is colored according to available light levels. A yellow time means that it is daytime. As the day wears on, the light number decreases. Once the light number reaches 50, the time becomes blue, which means that the sun has gone down and the Reaction Phase has moved into nighttime. This is important to watch carefully as your squadrons (and Allied units also) are affected by night conditions.



Message Level: As action occurs during the Reaction Phase, computer-generated message windows pop up, giving you information about these situations. Adjusting the message level increases/decreases the amount of messages received. For example, when units clash in air-to-air combat, you will see messages about which units are involved and what casualties were taken.

At **message level zero (0)** no messages appear (a useful setting to help speed up the Reaction Phase).



At **message level one (1)** only high priority messages appear, such as detection of incoming raids.



At **message level two (2)** a set of intermediate information is displayed, such as a target being strafed by a fighter sweep.



At **message level three (3)** all messages are displayed (units taking off from distant airfields, names of killed or wounded pilots, recon photos taken, etc.).

Note that the display of these messages inevitably slows down game speed during Reaction Phases to allow you time to read them. For maximum speed, set the messages to a lower number, or turn them off completely.

Other messages: In addition to the messages generated by the computer during Reaction Phases, various other pop-up messages can appear during any phase of play. These include:

- Button/Hot Text Help Messages: These appear when you move the mouse over the buttons and hot text on the tabs. Button help messages also include an associated Hot Key, if applicable. You can turn off these messages on the Game Option screen.

(b) Target Info Messages: These will appear when the mouse pointer is positioned over a target (when zoomed-in, you may need to position the pointer over the exact center of a target icon for the message to appear). These messages cannot be turned off, and are very important, providing information about which units are located at the target, what damage the target has sustained, its production capacity, etc.

The extent and accuracy of the details is based on whether you are playing as the Allies or the Axis. The Axis player always has full information about his targets. The Allied player's information, however, is based on how recent his recon photos are. As the Allied player successfully recons targets, more and more information becomes available to him. Bomber units may take recon photos of the targets they attack. However, their recon information is usually not as accurate as that acquired from specialized recon units. Thus, it is to the Allied player's advantage to assign recon missions to targets, even if current recon photos from bombing missions are available.



Game Options: Select this option to enter the Game Options screen to set various visual and play functions.

Star Counter: Incoming raids, once they are picked up on Axis radar, appear first as a rectangular (flag-shaped) counter with a white star. An orange counter represents an incoming raid. A red counter represents an outbound raid. Once a raid is "visually" sighted by ground spotters or from units in the air (such as patrols, see below), the counter turns into a 3D top-down graphic of the "lead" unit in the raid. **NOTE:** this counter (and the associated 3D graphic) is visible only to the Axis player, and only when playing in 3D mode (flight lines turned off)

Set Patrol

you may place units these steps:

(1) Select "Set Pa tab. This places you

(2) On the botto to "Set Patrol Locati *map you wish a unit* not select a spot in t the Allied side.] If y spot, the game warn

(3) Once you've bottom tab opens to

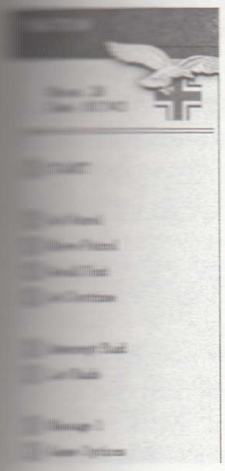
choose to launch a unit in full, o aircraft from that unit. Select all the u the scroll bar to advance down the list. units, you must set the altitude of corner of the tab is an altitude in patrols at lower or higher altitudes, the choosing units The default altitude means it may detect raids coming feet). Setting patrols at 5,000 to 6, raids attempting to fly under radar. detect raids coming in within 5,000 altitude setting.

AIRCRAFT TO PATROL

		doc	aircraft	ready	exp
	launch 2	DB	Do 217J	2	40
	launch 3	DB	Do 217N	12	59
	launch 3	DB	Do 217N	9	64
	launch 2	DB	Do 217N	3	57
	launch 3	DB	Do 217N	11	60

When you are finished selecting units tab. This places you back in Set Patrol m to select another patrol location. Notice are marked on the map. This helps sent patrols.

Reaction Phase Tab

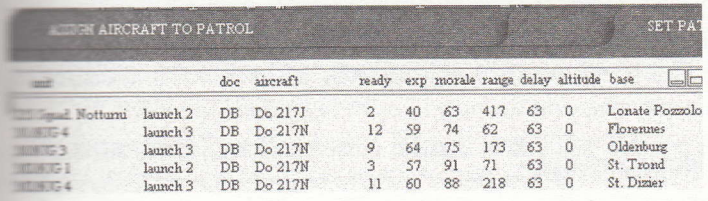


Set Patrol: At any time during the Reaction Phase, you may place units on patrol. To do so, follow these steps:

(1) Select "Set Patrol" on the Reaction Phase tab. This places you in the Set Patrol mode.

(2) On the bottom tab, you are prompted to "Set Patrol Location." *Select any spot on the map you wish a unit to patrol*. **Note**: You cannot select a spot in the English Channel or on the Allied side.] If you select an illegal patrol spot, the game warns you with a message.

(3) Once you've selected a location, the bottom tab opens to give you a list of available units. From this list, *choose your unit(s) to patrol the selected location.* You may choose to launch a unit in full, or launch a small group of those aircraft from that unit. Select all the units or portions you wish. Use the scroll bar to advance down the list. **IMPORTANT:** Before you choose units, you must set the altitude of the patrol. In the bottom right-hand corner of the tab is an altitude indicator. If you wish to set your patrols at lower or higher altitudes, then set the altitude here first before choosing units The default altitude for patrols is 15,000 feet which means it may detect raids coming in between 10,000 and 20,000 feet). Setting patrols at 5,000 to 6,000 feet, will help detect Allied raids attempting to fly under radar. So basically, patrols can usually detect raids coming in within 5,000 feet above or below their current altitude setting.



unit		doc	aircraft	ready	exp	morale	range	delay	altitude	base
Squad. Notturni	launch 2	DB	Do 217J	2	40	63	417	63	0	Lonate Pozzolo
KG 4	launch 3	DB	Do 217N	12	59	74	62	63	0	Florennes
KG 3	launch 3	DB	Do 217N	9	64	75	173	63	0	Oldenburg
KG 1	launch 2	DB	Do 217N	3	57	91	71	63	0	St. Trond
KG 4	launch 3	DB	Do 217N	11	60	88	218	63	0	St. Dizier

(4) When you are finished selecting units, *click "Done" on the bottom tab.* This places you back in Set Patrol mode and you are prompted to select another patrol location. Notice that your selected locations are marked on the map. This helps you keep track of where you've sent patrols.

(5) *Repeat steps 2-4 to set as many patrols as you wish.* Once you've completely finished setting all patrols, *select "Continue" on the Reaction Phase tab to return to the Reaction Phase.*

Your patrols will launch according to their delay number (see previous above), which is the number of minutes it will take the unit to launch. Once it reaches its patrol location, a unit will fly a square pattern over the area and remain there until it must return to base due to low fuel, or because you direct it move it to another location (see "Move Patrol" below).

Assigning Patrols to Intercept Raids: You can assign patrolling units to intercept raids before or after they reach their patrol destination. See page for details about how to reassign patrollers as interceptors.

The Purpose of Setting Patrols: The purpose of sending up patrols is to get units in the air quickly to intercept incoming raids, and to get "visual" confirmation on a raid's aircraft complement. When raids come into the general vicinity of a patrol, the patrol may break off and intercept the raid, so if you can anticipate when and where raids will appear, you can already have fighters in the sky for interception. Also, when a raid is first identified by radar, it's simply a number of aircraft and not the complement of fighters versus bombers. Having patrols in the sky to meet raids as soon as they come over the English Channel gives you quicker unit identification and thus makes your task of assigning interceptors much easier.

There's no hard-and-fast rule about when it's appropriate to launch patrols, but here are some suggestions:

(1) Watch your radio activity closely, and when it begins to reach 400-500 points, consider launching patrols.

(2) Use units stationed in western France, etc., to patrol the coastline. Patrolling along the coast helps you visually spot and identify raid aircraft complements quickly.

Setting Patrols in Full Screen Mode: If you are playing in full screen mode (see p. 49) you can set patrols by using the "P" hot key, or right clicking anywhere on the map to open full screen options.

Move Patrol

Move Patrol: Once you have patrols airborne, you may move them to other locations. To do so, follow these steps:

(1) *Select "Move Patrol" on the Reaction Phase tab.* This places you in the Move Patrol mode. Immediately, all patrols on the map highlight.

(2) *Select one highlighted patrol on the map.*

as many patrols as you wish. Once you
patrols, select "Continue" on the Reac
tion Phase.

cording to their delay number (see gra
f minutes it will take the unit to laun
on, a unit will fly a square pattern over
must return to base due to low fuel
to another location (see "Move Pat

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ey reach their patrol destination. See p.
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to intercept incoming raids, and to ge
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open full screen options.

l: Once you have patrols airborne, you
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e Reaction Phase tab. This places you in
ely, all patrols on the map highlight.
ted patrol on the map.



the bottom tab, you are prompted to "Set New Patrol Location."
a legal spot on the map (see "Set Patrol" above). Immediately, a line
from the selected patrol to its new patrol location.

After setting a new patrol location, the prompt on the bottom tab
changes to "Select Patrol to Move" again. Repeat steps 2 and 3 until you
have moved all patrols you wish.

When you are finished setting new patrol locations, select
"Continue" on the Reaction Phase tab to continue the Reaction Phase. Your
patrols will begin moving to their new locations.

The Purpose of Moving Patrols: The purpose of moving patrols is to
position your units into areas where Allied raids are moving. Oftentimes,
you'll pick patrol locations that prove fruitless, so it's necessary to correct
the problem. Moving patrols can also bring them into the direct path of
incoming raids, thus turning patrols into interceptors.

Moving Patrols in Full Screen Mode: If you are playing in full screen
mode (see p. 49) you can move patrols by using the "M" hot key, or right
clicking anywhere on the map to open full screen options.



Recall Unit: Any unit in the sky can be ordered to return to its base (i.e., recalled). To recall a unit, follow these steps:

(1) Select "Recall Unit" on the Reaction Phase tab. This places you in the Recall Unit mode. Immediately, all of your units on the map highlight (if they weren't already highlighted).

(2) On the bottom tab, you are prompted to "Select Unit to Recall." Select the unit you wish to recall. The unit immediately un-highlights to show you which units you've already recalled, and you're prompted again to select another unit.

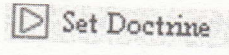
(3) Repeat step 2 until you are finished recalling units.

(4) Once you are completely finished, select "Continue" on the Reaction Phase tab to continue the Reaction Phase. Your recalled units should now begin returning to base.

The Purpose of Recalling Units: There are a number of reasons why you might wish to order a unit to return to base. If you've put up a lot of patrols, and the Allies only threw a few raids at you, you are going to have a lot of units in the sky doing nothing but getting fatigued and wasting fuel. You'll probably want to order these units back home quickly. Also, if you've ordered units to intercept a raid (see below), and you realize that the interceptors can't reach their target, you'll want to order them home to keep them from wasting time.

"Quick Recall" method: A faster way to recall several units that are operating in the same area is to *select the "Recall Units" function*, position the mouse pointer near the first unit you wish to recall, then *hold down the mouse button to drag an expanding red "rubber band" line around the desired units.* Units within the square you've drawn will be recalled once.

Recalling Units in Full Screen Mode: If you are playing in full screen mode (see p. 49) you can recall units by using the "R" hot key or right clicking anywhere on the map to open full screen options.



Set Doctrine: During the Reaction Phase, you may change the attack doctrine of your units. This function works the same as the Doctrine function found under the Movement Phase (see p. 38). Changing fighter doctrine during the Reaction Phase *does not affect* units which are currently in the air—only those that have not yet taken off.

Setting Doctrines in Full Screen Mode: If you are playing in full screen mode (see p. 49) you can set doctrines by using the "D" hot key or right clicking anywhere on the map to open full screen options.

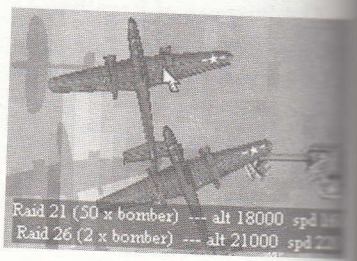


Intercept Raid: Intercepting Allied raids will certainly be your primary task during the Reaction Phase. Getting enough patrols in the air will help alleviate some of the pressure of having to launch so many interceptors, but inevitably you'll spend a lot of time spotting raids and then scrambling units to attack them. There are two ways to intercept a raid: by picking them individually on the map, or by using the "List Raids" function (see below). To intercept a raid by picking it on the map, follow these steps:

(1) *Select "Intercept Raid" on the Reaction Phase tab. This places you in the Intercept Raid mode.*

(2) On the bottom tab, you are prompted to "Select Raid to Intercept." *Move the cursor around the map to find the Allied raid you wish to intercept, and then click on that raid.* Notice that as you place the cursor over the raid(s), the message box appears giving you some information about the aircraft in the raid.





The message box gives you the raid ID number and the estimated number of aircraft in the raid (in parentheses), and if known, the composition of bombers and fighters. It also gives you the estimated altitude and speed of the raid. If you're in 3D mode, a "white star" counter (either orange or red) is a raid that has been picked up on Axis radar, but has not been visually spotted. A 3D aircraft model (which represents the "lead" unit in the raid) means that that raid has been visually spotted. This information should help you better determine which units to select for interception. **NOTE**: If you move the cursor over a large group of raids and then click, you will first be prompted with an interim tab asking you to select one raid from the group. Select this raid, and then proceed to step (3) below.

(3) Once you've selected a raid to intercept, the bottom tab opens and prompts you to "Select Interceptors." *Select the unit(s) in this list you wish to intercept the raid.*

	doc	aircraft		ready	exp	morale	range	delay	flying	base
Gruppo CT	launch 1	BF	Me 109G-2	>>	0	41	65	166	8	0	Lecce
Stormo CT	launch 3	BB	MC.205 Veltro	>>	0	45	59	166	8	0	Lecce
Gruppo intercett	launch 3	BF	Re.2001 Falco	>>	0	54	51	166	8	0	Lecce
Gruppo intercett	launch 3	BF	Re.2001 Falco	>>	0	48	71	216	11	0	Amendola
Gruppo CT	launch 3	BB	MC.205 Veltro		6	55	53	233	4	0	Capua
Gruppo CT	launch 3	BF	Re.2001 Falco		9	46	64	147	4	0	Capaccio

You may select units in full, or you may select groups of 3 or less. As you select, a series of double arrows appear next to the "ready" column. This means that this entire unit (or a portion of that unit) has been ordered to intercept the selected raid. You may choose any number of units to intercept. **IMPORTANT**: Notice that not *all* of your units are listed here. A variable number of units appear for you to select. This list represents the units which could possibly reach the selected raid in time to intercept it.

As you select units, notice that at the bottom of the tab, the total of all interceptors is displayed. This helps you keep track of how many planes you've assigned to attack the raid. You may also select the "base" name of a unit to draw a line from its base to the selected raid. (This helps give you a visual idea of how far away from the raid the interceptor's base is.)

Also note that some units listed are either already in the air or are en route to intercept other raids ("flying" column). You can select these units and redirect them to intercept the current raid. It may take time for them to respond to the order and frankly, it may not be worth your time. When choosing interceptors, you'll want to keep in mind the distance from the unit's base to the raid, and also the time (or delay) it will take for the interceptors to get off the ground. You'll also want to choose units based on their attack doctrine ("doc" column). For example, if you're attempting to intercept a formation of 25 bombers with no fighter escort, you may wish to scramble fighter units set on Dive-Bounce-bomber tactics (DB or BB).

(4) *Click "Done" on the bottom tab once you are finished selecting units.*

(5) *Repeat steps 2-4 to continue selecting and intercept raids.*

(6) When you are finished selecting and intercepting raids, click *"Continue" on the Reaction Phase tab to continue the Reaction Phase.* Your interceptors will begin to launch according to their "delay" number.

The Purpose of Intercepting Raids: You should begin intercepting raids as soon as they start appearing on the map (although in certain circumstances it might be prudent to allow Allied formation to come further inland before launching interceptors). Intercepting Allied raids is really the only way the Axis player can destroy and break up bomber formations. Though you have ground defenses, which will destroy their share of raiders as they pass over targets, scrambling your units to intercept is essential to prevent the Allies from achieving victory. You scramble interceptors to engage and destroy enemy aircraft, and you also scramble interceptors to "break up" raid formations. Since the Allied player scores points by both destroying Axis aircraft and targets (see p. 89), intercepting a huge bomber formation and forcing it to break off and return home is just as significant as actually destroying aircraft in that raid.

Reaction Phase progresses, and as more
your first inclination may be to try to
This is not recommended. Not only
intercept every raid, attempting to do so will
in jeopardy, and unnecessarily increase
want to review all Allied raids carefully
can damage the most. To conduct a
which raids to attack, you should use the
below.

Intercepting Raids in Full Screen Mode: If
mode (see p. 49) you can intercept raids by
clicking anywhere on the map to open full

List Raids: Instead of
selecting them on the map
raids by selecting "List Raids" on the Re
you to review the details of the raids more th
using this function, follow these steps:

*Select "List Raids" from the Reaction Phase
Raid mode.* Immediately, the bottom t
raids currently underway.

ID	A/C	ftr	bmr	spd	alt	sector
25	1	?	?	360	38000	Haamstede
26	150	0	150	160	24000	Neersen
27	100	0	100	140	14000	Neersen
28	50	50	0	260	29000	Neersen
29	75	0	75	140	17000	Neersen
40	40	0	40	180	17000	Neersen

ID: This is the ID number assigned to
trollers. Alongside the ID number, yo
with this symbol are outbound.

A/C: This is the estimated number of aircra
that have not been visually sighted
quite inaccurate.

This is the estimated number of clos
raid. If the raid has not been visually
question mark (?). High escort fighte
sidered a separate raid and are listed

sted are either already in the air on pa
ner raids ("flying" column). You can
hem to intercept the current raid, bu
nd to the order and frankly, it may n
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eptors to get off the ground. You'll
heir attack doctrine ("doc" column).
intercept a formation of 25 bombers
to scramble fighter units set on Direct
B).

m tab once you are finished selecting

ue selecting and intercept raids.

selecting and intercepting raids, sele
tab to continue the Reaction Phase.
according to their "delay" number.

g Raids: You should begin intercepti
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o allow Allied formation to come furth
tors). Intercepting Allied raids is rea
n destroy and break up bomber form
defenses, which will destroy their sha
ts, scrambling your units to intercept
m achieving victory. You scramble inte
my aircraft, and you also scramble inte
nations. Since the Allied player scor
ircraft and targets (see p. 89), intercep
forcing it to break off and return hom
estroying aircraft in that raid.

the Reaction Phase progresses, and as more and more raids start coming in, your first inclination may be to try to intercept every single raid detected. This is not recommended. Not only is it virtually impossible to intercept every raid, attempting to do so will just put too many of your aircraft in jeopardy, and unnecessarily increase pilot fatigue (see p.). You'll want to review all Allied raids carefully, and pick those you think you can damage the most. To conduct a better, more thorough review of which raids to attack, you should use the "List Raids" function described below.

Intercepting Raids in Full Screen Mode: If you are playing in full screen mode (see p. 49) you can intercept raids by using the "I" hot key, or right clicking anywhere on the map to open full screen options.

List Raids

List Raids: Instead of intercepting raids by selecting them on the map, you can also review a full list of raids by selecting "List Raids" on the Reaction Phase tab. This allows you to review the details of the raids more thoroughly. To intercept raids using this function, follow these steps:

1) *Select "List Raids" from the Reaction Phase tab. This places you in the Intercept Raid mode.* Immediately, the bottom tab opens to reveal a set of Allied raids currently underway.

raid ID		A/C	ftr	bmr	spd	alt	sector	range	intercepts
33	-o	1	?	?	360	38000	Haamstede	36	0
36		150	0	150	160	24000	Neersen	6	0
37		100	0	100	140	14000	Neersen	5	0
38		50	50	0	260	29000	Neersen	8	0
39		75	0	75	140	17000	Neersen	8	0
40		40	0	40	180	17000	Neersen	9	0

Raid ID: This is the ID number assigned to the raid by your controllers. Alongside the ID number, you may see a "-0". Raids with this symbol are outbound.

A/C: This is the estimated number of aircraft in the raid. For raids that have not been visually sighted, this number may be quite inaccurate.

Ftr: This is the estimated number of close escort fighters in the raid. If the raid has not been visually sighted, this will be a question mark (?). High escort fighters (see p. 77) are considered a separate raid and are listed as such.

Bmr: This is the estimated number of bombers in the raid. If the raid has not been visually sighted, this will be an "E".

Spd: This is the estimated speed of the raid. Slow moving raids tend to be easier to intercept, and often (but not always) denote formations with bombers.

Alt: This is the estimated altitude of the raid. When you assign ble interceptors, you don't have to worry about altitude. The game automatically takes your units up to the altitude necessary for interception, and then attacks according to doctrine.

Sector: This indicates the nearest sector airfield to the raid.

Range: This is the distance to the nearest sector airfield.

Intercepts: This is the number of interceptors currently assigned to attack the raid.

(2) *To choose a raid on this list, simply click on the button to the left of its ID number.* The raid immediately highlights on the map. You may continue to select raids in this fashion until you find the raid you want to intercept. You can only intercept one raid at a time.

(3) Once you've chosen a raid, *select either the "Intercept" or "Recall" tab at the top of the bottom tab.* If "Intercept," proceed to step 4. If "Recall," step 5.

(4) Selecting "Intercept" places you in the list of units you may choose to intercept the raid. *Select the units on this list* (see p. 58 for full details on how to choose interceptors), *then click "Done" on the bottom of the tab to return to the raid list.* Proceed to Step 6 below.

(5) Selecting "Recall" places you in the list of units which are currently intercepting the raid. **Note**: It's only necessary to select this option if you've already ordered units to intercept; otherwise, there will be no units to recall. Once here, *select the units you wish to send home (i.e., recall them), or set the units on patrol in their current location.* When finished, *click "Done" on the bottom of the tab to return to the raid list. Proceed to Step 6 below.* On the Raid List is a "Recall All" button. You may select this button to recall *all interceptors from all raids.*

unit	doc	aircraft	flyin
JG 26	DB	FW 190A	30
JG 11	DB	FW 190A	27
[illegible]JG 4	DB	Do 217N	5
[illegible]JG 4	DB	Do 217N	11

selected for recall return to their home Phase continues; units set on patrol st and begin patrolling in place as soon as the

steps 2-5 until you are finished assign click "Done" on the bottom of the Ra Phase.

If the Reaction Phase is "stopped," *select t*

Purpose of Intercepting Raids Usi Using the "Raid List" function allows yo and then assign interceptors to all or some quickly and often. One moment you may and the next moment that raid may t One common tactic for the Allies is to ha together in one large group, and then break a spot over Europe. They do this to mislead and spotters. So watch for this carefully. that the raid list *is not a full list of all raids* listed here are those that are considered the Raids that have already dropped t home in smaller groups or have broken i interception, are often not listed here because if will be over 100+ raids. Such a number of to keep track of in an all encompassing If you wish to intercept a raid that doesn't s the interception function described on pag raid.

Intercepting Raids in Full Screen Mode: If mode (see p. 49) and using the List Raids raids by using the "CTRL_R" hot key, or righ map to open full screen options.

unit	doc	aircraft	flying	exp	morale	range	base
JG 26	DB	FW 190A	30	73	91	122	Wevelghem
JG 11	DB	FW 190A	27	72	90	33	Duren
III/NJG 4	DB	Do 217N	5	74	78	165	Juvincourt
I/NJG 4	DB	Do 217N	11	60	88	229	St. Dizier

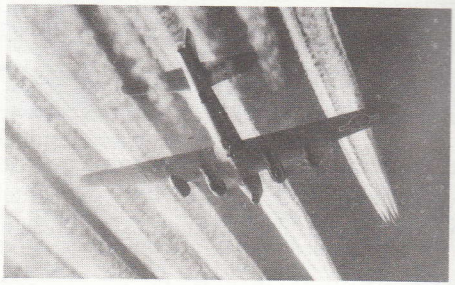
selected for recall return to their home base as soon as the Phase continues; units set on patrol stop intercepting their and begin patrolling in place as soon as the Reaction Phase con-

Repeat steps 2-5 until you are finished assigning or recalling inter- then click "Done" on the bottom of the Raid List tab to return to Reaction Phase.

If the Reaction Phase is "stopped," *select the "START" button to* again.

The Purpose of Intercepting Raids Using the "Raid List" Using the "Raid List" function allows you to review a larger list and then assign interceptors to all or some of them. The raid list changes quickly and often. One moment you may see a raid listed with aircraft, and the next moment that raid may turn into a dozen small- One common tactic for the Allies is to have several smaller raids together in one large group, and then break apart once they reach a specific spot over Europe. They do this to mislead and confuse your radar and spotters. So watch for this carefully. Also, it's important to that the raid list *is not a full list of all raids currently in the air.* The listed here are those that are considered the most valuable (or most dangerous). Raids that have already dropped their payloads and are home in smaller groups or have broken into smaller groups due interception, are often not listed here because if they were, the list may well be over 100+ raids. Such a number of raids would be difficult to keep track of in an all encompassing list, and hamper game If you wish to intercept a raid that doesn't show up on the list, then the interception function described on page p. 58 to select that specific raid.

Intercepting Raids in Full Screen Mode: If you are playing in full mode (see p. 49) and using the List Raids function, you can inter- raids by using the "CTRL_R" hot key, or right clicking anywhere on the map to open full screen options.



Allied Raid Planning Phase

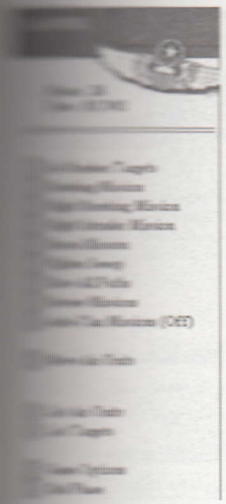
The Raid Planning Phase is where the *Allied* player plans his mission (i.e., raids) for the upcoming day. Thus, the decisions you make here are of utmost importance. It is here—in this phase—that your victory or defeat is determined. Though you have little or no control over how the Axis player will assess and attack your raids as they begin arriving over his country, the decisions you make here may greatly deter his interception success, and also seal your fate as the Allied commander.

As the Allied player, the burden of achieving victory (in most of the campaigns, see p. 89) rests on your shoulders. The Axis player simply has to prevent you from winning, and as the defender, he has the advantage. To win the game, you have to plan your raids carefully.

Range Indicator: The Allied player can click on a target to see how far it is from the closest Allied airfield. Move the mouse arrow over a target (like Schweinfurt, for example) and left-click. A white line and box appears on the map connecting the target to an Allied field. The box and line stays on the map for a short time, and a message box, showing the target's name and range from the connecting field, appears.

Command Highlighting: The Allied player may also click on any HQ shown on the map. When selected, all attached airfields and subordinate commands highlight in blue. Once you have a command group highlighted, if you THEN click on an Axis target to view range (see above), the game will find the nearest airfield for the highlighted group. Depending upon the maximum range you've set on the "Set Bomber Targets" tab (see p. 67), a red range circle appears showing you the maximum mission range that units from that command group will fly (if you allow your staff to plot raids for that group). **IMPORTANT:** THIS FEATURE ONLY WORKS IN THE Allied Raid Planning Phase.

Allied Planning Phase Tab



Set Bomber Targets

your options is to allow all) of your missions f Phase. Your staff can pl missions (such as smal intruders), giving you ti missions you wish to pe staff plots missions you or modify them as you plot missions, follow th

(1) *Select "Select B Planning Phase tab.* Th mode. Immediately, the reveal a set of staff optio

(2) As soon as the bottom tab opens, you commands on the right tab:

- Fighter Command
- Bomber Command
- 2nd Tactical Air Force
- 8th Air Force
- 9th Air Force
- 12th Air Force
- 15th Air Force
- Med Air Command
- 205 Bomber Group

If you select the first command, your staff *you may change the command group by si right tab.* Once you've selected a comma targets.



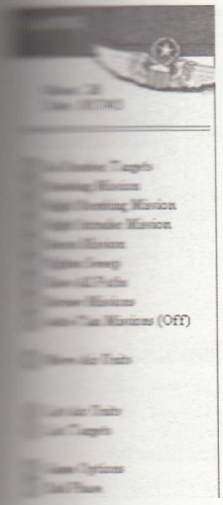
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ere the *Allied* player plans his missio
. Thus, the decisions you make here
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u have little or no control over how
k your raids as they begin arriving
ake here may greatly deter his inten
ate as the Allied commander.
den of achieving victory (in most of
ur shoulders. The Axis player simply
d as the defender, he has the advanta
n your raids carefully.

player can click on a target to see
field. Move the mouse arrow over a
e) and left-click. A white line and
he target to an Allied field. The box
time, and a message box, showing
connecting field, appears.

Allied player may also click on any
d, all attached airfields and subordin
ce you have a command group high
xis target to view range (see above),
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set on the "Set Bomber Targets" tab (
s showing you the maximum missio
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MPORTANT: THIS FEATURE ON
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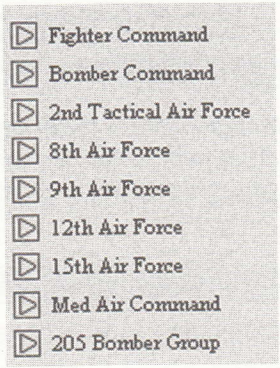
Planning Phase Tab



Set Bomber Targets: As *Allied* commander, one of your options is to allow your staff to plot some (or all) of your missions for the upcoming Reaction Phase. Your staff can plot all of the less important missions (such as small fighter sweeps and night intruders), giving you time to concentrate on those missions you wish to personally plan. Also, if your staff plots missions you don't like, you may cancel or modify them as you see fit. To have your staff plot missions, follow these steps:

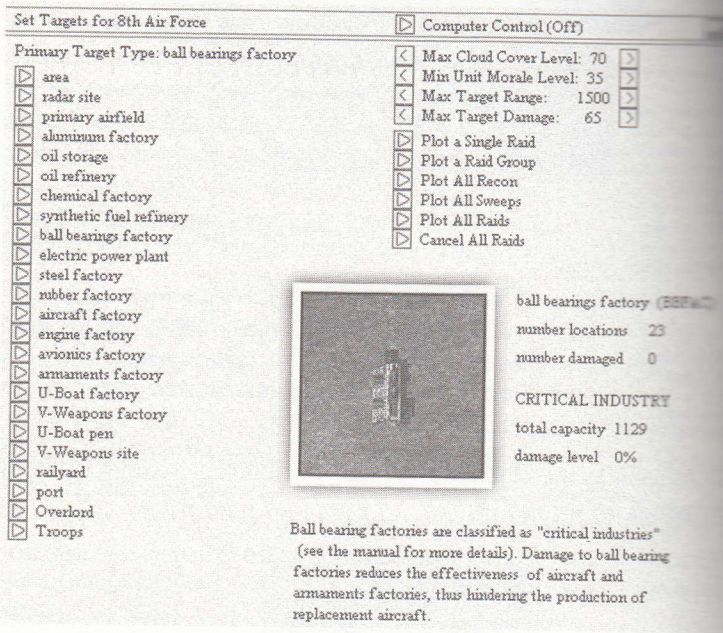
(1) *Select "Select Bomber Targets" on the Raid Planning Phase tab.* This places you in the Staff mode. Immediately, the bottom tab maximizes to reveal a set of staff options.

(2) As soon as the bottom tab opens, you'll notice a listing of Allied commands on the right tab:



If you select the first command, your staff will plot missions for you. *But you may change the command group by simply selecting a new one on the right tab.* Once you've selected a command group, you are ready to choose targets.

(3) *Select the target type (on the bottom tab) you wish your staff to plan missions against.*



Selecting another target type changes the picture and data in the bottom right-hand corner. This information is valuable to review when choosing targets, because it explains what the target is and its importance in the game.



ball bearings factory (BBFAC)
number locations 23
number damaged 0

CRITICAL INDUSTRY
total capacity 1129
damage level 0%

factories are classified as "critical industries"
manual for more details). Damage to ball bearing
duces the effectiveness of aircraft and
factories, thus hindering the production of
t aircraft.

anges the picture and data in the bot-
rmation is valuable to review when
s what the target is and its importance



ball bearings factory (BBFAC)
number locations 23
number damaged 0

CRITICAL INDUSTRY
total capacity 1129
damage level 0%

factories are classified as "critical industries"
manual for more details). Damage to ball bearing
reduces the effectiveness of aircraft and
factories, thus hindering the production of
aircraft.

The target information in the bottom right-hand corner shows the target type name, the number of actual locations of that target type, the number of locations currently damaged, the capacity of the target, and the damage percentage. The textual description beneath the target picture gives you details about the target and its signifi-
in the game. If the target is classified as a "critical industry" (see p.
them that information is also shown.

(4) Once you've selected a target type, *set the Maximum Cloud Level.*

Max Cloud Cover Level: 70

Setting a maximum cloud cover of 70, for example, tells your staff not to plot any raids for the upcoming Reaction Phase if the cloud cover will be 70% or higher.

(5) Once you've set the cloud cover, *set the Minimum Unit Morale Level.*

Min Unit Morale Level: 35

Setting a minimum morale level of 35, for example, tells your staff not to select any units which have a morale of 34 or lower.

(6) Once you've set the unit morale level, *set the Maximum Target Range.*

Max Target Range: 1500

Setting a max range here (in miles), tells your staff to plot raids against targets within the range indicated. So, if you set the range to 100 miles for the 8th AF, your staff will only plot missions against targets within 100 miles (give or take) from the form-up airfields. Whatever range you set here is displayed in a red range circle on the map AFTER you have selected a target with a command group highlighted. If, for example, you have the 8th AF's max range set to 100 miles, and you have all 8th AF airfields highlighted on the game map (using the command highlighting feature described above), a 100 mile red range circle appears immediately after selecting a target. This shows you the full range your staff has for plotting raids from the highlighted Allied airfield.

(7) Once you have set the maximum target range, *set the Maximum Target Damage*.



Setting the max target damage tells your staff to plot raids against targets within the damage range indicated. For example, if you set the maximum damage range at 65, your staff will review its recon photos and plots missions against targets with 65 or less points of damage. It will not plot a mission against a target with 66 or more points of damage.

(8) After setting all the levels indicated above, *order your staff to plot a set of raids.* You may choose one of six orders.

Plot a Single Raid: When you select this order, you are immediately prompted to choose a primary target on the map. See p. 79 to learn how to choose a primary target. After choosing a primary target and clicking "Done" on the right tab, your staff chooses the unit(s) which will fly that mission. They will also pick the type of mission to fly against that target.

Plot a Raid Group: When you select this order, you are immediately prompted to choose a primary target on the map. See p. 79 to learn how to choose a primary target. After choosing a primary target and clicking "Done" on the right tab, your staff will plot a single mission to that target, plus a series of other raids against targets in the surrounding area.

Plot all Recon: When you select this order, your staff automatically plots a series of recon missions against various targets in Europe (with an emphasis on picking locations of the target type you have designated). See p. 80 for more information on recons.

Plot all Sweeps: When you select this order, your staff automatically plots a series of fighter sweeps against various targets in Europe (with an emphasis on picking locations of the target type you have designated). See p. 80 for more information on sweeps.

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t this order, your staff automatically
er sweeps against various targets in
asis on picking locations of the target
ted). See p. 80 for more information.

Plot all Raids: When you select this order, your staff automatically plots a variety of raids against various targets in Europe (with an emphasis on picking locations of the target type you have designated).

Cancel all Raids: When you select this order, your staff will cancel all raids it has plotted for the selected group *only*.

(4) *Repeat the steps above to continue ordering your staff to plot raids until you are finished, or they tell you that you have "run out of resources."*

Running out of Resources: It's important to note that your staff isn't perfect, and they will generally be very conservative when plotting raids. There's a lot of randomness built into the staff function, and they may often plot raids you consider foolish. But as the Allied commander, you have the right to reject anything your staff suggests, and you may personally modify the raids accordingly. During raid plotting, there will come a time when your staff will tell you that it has "insufficient resources" to carry out your request. Kindly smile at them, then escort them to a truck which will carry them far, far away to a prison for their insubordination. Bad kidding aside, you need to know that your staff is doing the best it can and, oftentimes, it will plot a lot of very good raids. For example, you'll notice that they almost always assign secondary targets (see p. 71) when planning bombing missions. This is a very good thing to do, as there are a lot of times when a raid simply cannot reach or find its primary target. If it doesn't have a secondary target to attack, it'll just turn around and go home. So, you can learn a lot from your staff. Just don't believe everything they tell you.

Modifying Raids: Your staff will show you the raids as it plots them, and you may modify them accordingly. *To modify a raid, click on its name then select the "modify" tab to open the appropriate raid plotting sub-tab.* See p. 81 for more information.

Canceling Raids: In addition to ordering your staff to cancel all raids for a particular group, you may select a raid in the list and then select the "cancel" tab. The raid is removed from the list, and its line stays open for any additional raids you may wish to add later.

The COMPUTER CONTROL Function: This feature appears at the top of the "Set Bomber Targets" tab and can be toggled on by Group. If is toggled ON for the 8th Air Force, for example, your staff will automatically plot all raids for 8th AF each turn, starting with the turn AFTER you set the feature to "on." So, each time you enter a new Raid Planning Phase, all missions for 8th AF will be plotted for your review and modification (if necessary). For this feature to work, however, you must have the "Auto-Plan Missions" function toggled ON. See p. 83 for more details.

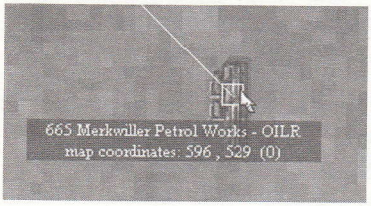
Mandatory Targeting: In certain scenarios, your staff is forced to plot raids against what the Allies consider political targets. This "mandatory targeting" feature is fully explained on p. 97.

Bombing Mission **Bombing Mission:** Select this option to plot bombing missions. Follow these steps:

(1) *Select "Bombing Mission" on the Raid Planning Tab.* This opens the planning sub-tab.

Primary (2) *On the planning sub-tab, select "Primary" to set your primary target. Once you've done so, find and select a target on the map you wish to designate as the primary target.* This is the main target your raid will go after.

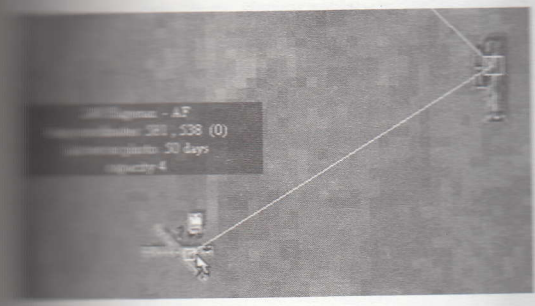
Primary Target Selection



Once the primary target is selected, a white and red line is drawn from one of your airfields to the Axis target. The white line is the inbound path the raid will fly; the red line is its outbound path. The course and direction of these lines can be modified (see below). Your airfield, which is highlighted with these lines, is called the "form-up" airfield. This is the airfield at which all of your air units will gather to form the raid.

(3) *If desired, select "Secondary" to set a secondary target. Once you've done so, select a target on the map (relatively close to the primary target) you wish to designate as the secondary target.* When selected, a yellow line and box highlights it from the primary target.

Target Selection



Set your flight paths.

There are two ways to adjust your raid's flight p
path buttons described below, or by adjusting the
navigation points to a location directly on the map

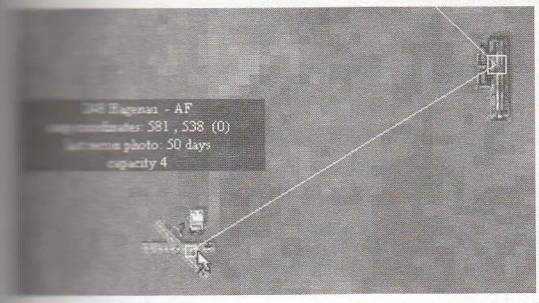
Inbound: This is the first navigation point that a rai
Inbound to the target. *To set the inbound point,*
then click on the map. The "white" li
to indicate where the inbound point

Initial Point: This is the second navigation point t
Initial Point its path to the target. *To set the initi*
option, then click on the map. T
inbound line) will adjust its shape a
the initial point is.

Exit Point: This is the first navigation point that
Exit Point path from the target back to its bas
first select this option then click on t
(i.e., inbound line) will adjust its s
where the exit point is.

Outbound: This is the second navigation point t
Outbound its path from the target back to its b
point, first select this option, then clic
line (i.e., outbound line) will adjus
where the outbound point is.

Secondary Target Selection



It's recommended that you set secondary targets often, because your raids may not always find (or reach) their primary targets. Once your raids are in the air, there's nothing you can do to help them, so help them now by giving them two targets to choose from.

Set your flight paths.

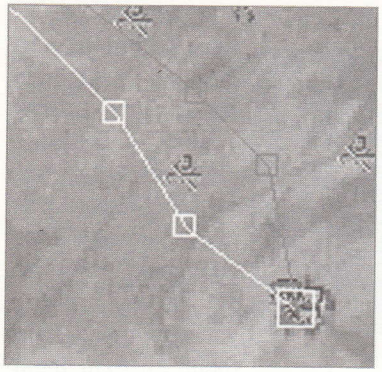
There are two ways to adjust your raid's flight path: by using the flight path buttons described below, or by adjusting the path by dragging the navigation points to a location directly on the map.

Inbound: This is the first navigation point that a raid will fly to on its path to the target. *To set the inbound point, first select this option, then click on the map.* The "white" line will adjust its shape to indicate where the inbound point is.

Initial Point: This is the second navigation point that a raid will fly to on its path to the target. *To set the initial point, first select this option, then click on the map.* The "white" line (i.e., inbound line) will adjust its shape again to indicate where the initial point is.

Exit Point: This is the first navigation point that a raid will fly to on its path from the target back to its base. *To set the exit point, first select this option then click on the map.* The "red" line (i.e., inbound line) will adjust its shape again to indicate where the exit point is.

Outbound: This is the second navigation point that a raid will fly to on its path from the target back to its base. *To set the outbound point, first select this option, then click on the map*. The "red" line (i.e., outbound line) will adjust its shape to indicate where the outbound point is.



"Dragging" navigation points another way to set and inbound, IP, exit, and points is to simply position the pointer on the desired point, down the right button, and drag point to the new location. The lines will follow automatically. This a much more efficient way of adjusting your flight paths, and it is recommended that you use this method as much as possible.

The Purpose of Adjusting Your Flight Paths: The purpose of adjusting your raid flight paths is two-fold. First, you can navigate around heavy flak areas (which is highly desirable), and second, adjusting your flight path can dramatically mislead your Axis opponent into thinking that you are actually en route to another area of the map. But be careful. If you adjust the lines too dramatically, you may actually change the location of a raid's "form-up" airfield, which in turn could change the list of units available for the raid (see below).

Targets of Opportunity: When setting flight paths, you may wish to consider flying over targets along your outbound line, because if a raid cannot find its primary or secondary target, then during its flight, its target spotters may get a glimpse of "targets of opportunity." If it does, then very likely the raid will drop its bombs. Consider this tactic with extreme caution, however, for if a raid flies over targets fat with ground defenses, you could get cut to pieces. Raids turned back due to morale failure, drop their bombs immediately and ineffectively, and thus will never seek out targets of opportunity.

(5) *Select "Follow" to have th path as the previous raid.* O feature if this is your first raid. H might be worth your time to consi This tactic was used quite often by th great effect. Having several raids of one large inbound formation, opponent into over-committing h

(6) *Select "Shuttle" to have airfield than its home base.* prompted on the bottom tab *one of your airfields on the map.* Th airfield for the raid. As soon as t immediately reattaches itself to the airfield is assigned, and will be One important note to make is, a raid, it's possible that units in th unit is disbanded only as a result of and only if it runs out of operationa from the game, and its aircraft a pool. One reason you may wis field is, again, to confuse your Axis op

Altitude: 20000

(7) *Set th* raid is ass may adjus left/right arrows on the planning sub-ta altitude until after you've assigned unit up to 50,000 feet, or as low as 100 feet. affect the success of your raid (esp set the altitude too high, the raid wil target. If you set the altitude too low, y by flak and balloon barrages. So, the altitude is to first pick your units, th "planes" database (see p. 24) to see air that works well within your aircra

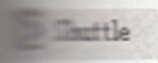
"Dragging" navigation points is another way to set and move inbound, IP, exit, and outbound points is to simply position the mouse pointer on the desired point, hold down the right button, and drag the point to the new location. The route lines will follow automatically. This is a much more efficient way of adjusting your flight paths, and it is recommended that you use this method as much as possible.

Your Flight Paths: The purpose of adjusting fold. First, you can navigate around heavy rable), and second, adjusting your flight our Axis opponent into thinking that you area of the map. But be careful. If you you may actually change the location of h in turn could change the list of units.

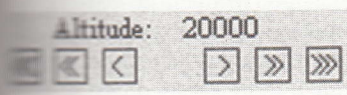
hen setting flight paths, you may wish to g your outbound line, because if a mission dary target, then during its flight, its turn "targets of opportunity." If it does, then ombs. Consider this tactic with extreme es over targets fat with ground defenses turned back due to morale failure, drop effectively, and thus will never seek out



(5) *Select "Follow" to have this raid follow the same flight path as the previous raid.* Of course, it isn't necessary to select this feature if this is your first raid. However, later in the Planning Phase, it might be worth your time to consider having some raids follow others. This tactic was used quite often by the Allies during the actual battle and to great effect. Having several raids following each other can give the illusion of one large inbound formation, which in turn could mislead your foes opponent into over-committing his forces.



(6) *Select "Shuttle" to have the raid return to a different airfield than its home base.* Once you've selected this feature, you are prompted on the bottom tab to choose a shuttle airfield. *Choose one of your airfields on the map.* This airfield is now considered the shuttle airfield for the raid. As soon as the raid reaches its shuttle airfield, it immediately reattaches itself to the new command, under which your shuttle airfield is assigned, and will be able to function normally in the future. One important note to make is, that if you do assign a shuttle airfield to a raid, it's possible that units in the raid may become "disbanded." A unit is disbanded only as a result of being reassigned to a shuttle airfield, and only if it runs out of operational aircraft at the time. The unit is removed from the game, and its aircraft are rotated back into the Allied replacement pool. One reason you may wish to "shuttle" a raid to another airfield is, again, to confuse your Axis opponent as to where your units are located.



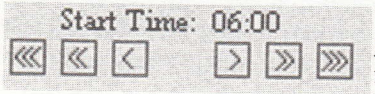
(7) *Set the altitude for the raid.* Each raid is assigned a default altitude. You may adjust this altitude by clicking on the left/right arrows on the planning sub-tab. You may wish to wait to set the altitude until after you've assigned units to the raid. Altitudes can be set up to 50,000 feet, or as low as 100 feet. The altitude you set will dramatically affect the success of your raid (especially for bombing missions). If you set the altitude too high, the raid will probably do little damage to its target. If you set the altitude too low, you run the risk of getting torn apart by flak and balloon barrages. So, the best tactic to use when choosing an altitude is to first pick your units, then review their statistics under the "planes" database (see p. 24) to see aircraft ceiling limits, then set an altitude that works well within your aircraft limitations.

NOTES: Level bombers release their bombs from the assigned altitude and return to their home base before descending to land. Dive bombers dive down to 1000 feet to release their bombs, and then climb back up to 6,000 feet to avoid barrage balloons and light flak on the way home. If you set an incoming altitude for dive bombers below [illegible] feet, they conduct a "glide" bombing attack and are not as effective. Fighters on sweep missions (see below) will dive down to 1000 feet and if they strafe airfields, and then climb back up to 6,000 feet to avoid balloons and light flak. Fighter sweeps and any other outbound fighter units which are flying directly over locations with balloon barrages, will dive down to attack the balloons, but keep in mind that there is a chance that they will get tangled in the cables.

High Altitude Raids: Any and all raids flying above 28,000 feet are much more susceptible to poor weather, wing icing, etc. Individual planes affected by such weather have a greater chance of turning around and going home. Keep this in mind when plotting raids at these high altitudes.

Low Level Night Raids: Any and all aircraft flying below 1000 feet during night missions run the risk of running into the ground, due to poor visibility. Keep this in mind when plotting low level night missions.

Flying Under Radar: Setting the altitude below 500 feet allows the raid to fly "under radar." Flying under radar has its advantages and disadvantages. Recons, night intruders, and small fighter sweeps have the best opportunity to fly under radar. They can reach their target, do their business, and be off before the Axis can do much about it. However, if you attempt to fly large formations under radar, you're likely to get cut to pieces by light AA guns and balloon barrages, so take extreme caution when assigning raids to fly under radar. Another thing to remember is that pilots flying low level raids, may become much more fatigued (see p. [illegible]



(8) *Set the raid's launch time (start time)*. The time you set is the time the raid launches from its form-up airfield. You cannot start a raid any earlier than 6:00 in the morning, and raids can be set to launch into the early hours of the next day. A raid's start time also directly affects its "time over target" (TOT) time which the game calculates for you based on the raid's start time and the units you choose. See below for more information about a raid's TOT.

Launch Delays and Poor Weather: During launch [illegible] (see below) is covered with heavy clouds, the [illegible] or units within the raid) will be delayed. If t[illegible] a message during play telling you so.

Pick Lead Unit (9) *Pick the lead unit for th[illegible] "Pick Lead Unit" on the plan[illegible]*

[illegible] which will lead the raid. Immediately the [illegible] you a list of available units; *select one unit to lea[illegible]* on this list carefully, as you want to pick [illegible] lead unit doesn't have to be very large, but i[illegible] as this will be the unit whose pilots spot the [illegible] the lead unit, the better chance the raid h[illegible] The list of units here is not a full list of every u[illegible] It is merely a selection of units that the game [illegible] particular raid, from that particular form-up [illegible] *selecting the raid's lead unit, click "Done" on* [illegible] ready to assign additional bomber units to th[illegible]

Pathfinders as Lead Units: Pathfinders (generall[illegible] often available as "lead" units. These units are very [illegible] high cloud cover days. Pathfinders are bette[illegible] dense cloud cover, so keep this in mind w[illegible]

Fighter Attack Missions: At the bottom of the Le[illegible] called "Fighter Attack." This feature allows [illegible] from a standard level-bombing mission to a [illegible] To change your mission to a fighter attack, *click t[illegible]* immediately refresh the lead bomber groups to fi[illegible] *follow these instructions to plan the mission norma[illegible]* a level-bombing mission, click this button OFF.

se their bombs from the assigned
base before descending to land.
o release their bombs, and then
rage balloons and light flak on the
itude for dive bombers below
bing attack and are not as effective
elow) will dive down to 1000 feet
mb back up to 6,000 feet to avoid
s and any other outbound fighter
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greater chance of turning around
n plotting raids at these high

and all aircraft flying below 1000
k of running into the ground, due
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nd small fighter sweeps have the
y can reach their target, do their
n do much about it. However, if
der radar, you're likely to get
on barrages, so take extreme
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come much more fatigued (see p.

8) *Set the raid's launch time* (
ime). The time you set is the time
aid launches from its form-up
ou cannot start a raid any earlier
be set to launch into the early
so directly affects its "time over
ates for you based on the raid's
below for more information

Launch Delays and Poor Weather: During launch time, if the form-up field (see below) is covered with heavy clouds, there is a chance that the raid (or units within the raid) will be delayed. If this occurs, you will be given a message during play telling you so.

Pick Lead Unit (9) *Pick the lead unit for the raid by selecting "Pick Lead Unit" on the planning sub-tab.* This is the unit which will lead the raid. Immediately the bottom tab opens to show you a list of available units; *select one unit to lead the raid.* Read the unit details on this list carefully, as you want to pick the best unit possible. Your lead unit doesn't have to be very large, but it should have good attributes, as this will be the unit whose pilots spot the target. So, the better quality the lead unit, the better chance the raid has of damaging the target. The list of units here is not a full list of every unit in your available air force. It is merely a selection of units that the game considers best suited for that particular raid, from that particular form-up field. *Once you are satisfied selecting the raid's lead unit, click "Done" on the bottom tab.* You are now ready to assign additional bomber units to the raid.

Pathfinders as Lead Units: Pathfinders (generally B-17s and B-24s) are often available as "lead" units. These units are very small, but are useful on high cloud cover days. Pathfinders are better at finding targets through dense cloud cover, so keep this in mind when assigning lead units.

Fighter Attack Missions: At the bottom of the Lead Unit tab, there is a feature called "Fighter Attack." This feature allows you to change your mission from a standard level-bombing mission to a fighter attack mission. To change your mission to a fighter attack, *click this button ON*. This will immediately refresh the lead bomber groups to fighter groups. *Then, just follow these instructions to plan the mission normally.* To change back to a level-bombing mission, click this button OFF.

Add Bomber Units (10) *Add additional bomber units to the raid by selecting "Add Bomber Units" on the mission sub-tab.* Immediately, the bottom tab refreshes to show you a list of available bomber units. Bomber units assigned as "additional bombers" to accompany a lead unit must come from the same group as the lead unit. They must also be of the same type (i.e., level bomber, fighter bomber, etc.). Thus, after selecting a lead unit, the game determines which additional bomber units (if any) are available to assign to the raid, and then gives you a list accordingly. If no bomber units meet the criteria above, no units are shown.

unit	aircraft		ready	exp	morale	range
1/812th Pathfinder	B-17G Fortress	*L	1	67	70	95
1/813th Pathfinder	B-17G Fortress	*b	1	66	74	95
100th BG	B-17F Fortress	b	21	57	72	87
2/812th Pathfinder	B-17G Fortress	*b	1	70	69	95

Select any and all units on this list that you wish to add to the raid. These units are immediately marked with a "b." Notice that the lead unit is present and is marked with an "L." The additional bomber units appearing here are a small selection of units the game considers best suited to accompany the lead unit on its mission. Once you are finished selecting units, click "Done" on the bottom tab. You are now ready to assign escort fighters to the raid.

Important Note: There are four primary attribute columns on the "pick lead" and "add bomber" tabs: readiness, experience (exp), morale, and range. Ready is the number of aircraft ready to fly in the unit; experience represents the overall quality of the unit; morale is the quality of the unit to press on in the face of losses; and range is the distance of the unit from the "form-up" airfield.

You should review these attributes carefully before picking bombers, as they will affect the overall performance of the raid during its mission. Pay particular attention to the ranges of your bomber units to their form-up and fields, because bomber units will trade off bombs for fuel; so if you have plotted a target a long way away from the form-up field, you should be able to reach the target, but you'll be carrying fewer bombs. See p. 25 for reduced bomb load information.

Add Fighter Escorts (11) *Add fighter escorts to the raid by selecting "Add Fighters" on the mission sub-tab.* Immediately, the bottom tab refreshes to show you a list of available fighter units. Each Allied fighter unit can fly one mission per day, but you must allow them the time between missions. In order to give you an idea of which fighters are assigned to early raids, a "#" appears on the fighter's readiness. This indicates that this unit has already flown a mission today and can be assigned for the current raid. The fighter unit you are attached to will also provide fighter escort. If the conditions mentioned above are not met, then the game will not show any fighter units.

unit	aircraft		ready
[illegible]	P-47C Thunderbolt	ce	42
[illegible]	P-47C Thunderbolt	ce	48
[illegible]	P-47C Thunderbolt	he	48

Select any and all fighter units on this list that you wish to add to the raid. These units are immediately marked with a "b." When you first select them, they will appear below).

As you select units for escort duty, notice that a green box and a yellow box appear along the inbound path of the raid. The green box indicates where the escorts will rendezvous with the raid; the green line indicates the length of the escort mission; the yellow box indicates where the unit will begin its mission and fly home. To adjust these elements, *right click on the inbound/outbound flight path.* The boxes and lines will move along the path accordingly. This adjustment changes the escort mission (see below).

Close Escort (ce): Close escort fighters position themselves between them and the interceptors. This is the best way to protect bombers from being attacked, but the escorts are at a disadvantage.

High Escort: High escort fighters fly above the bombers to engage enemy interceptors that fly nearby. High escort tactics allow the escort fighters to engage the interceptors at a distance. High escort tactics are not very effective at preventing bombers from being attacked, however. To change a fighter unit from close escort to high escort, first select the high escort button appearing at the bottom of the screen, then set the altitude you wish the fighters to fly.

) *Add additional bomber units to the raid by*
cting "Add Bomber Units" on the planning
om tab refreshes to show you a list of avail-
units assigned as "additional bombers" to
come from the same group as the lead unit
he type (i.e., level bomber, fighter bomber,
ead unit, the game determines which addi-
re available to assign to the raid, and then
no bomber units meet the criteria above, no

		ready	exp	morale	range
rtress	*L	1	67	70	95
rtress	*b	1	66	74	95
tress	b	21	57	72	87
rtress	*b	1	70	69	95

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vith a "b." Notice that the lead unit is present
additional bomber units appearing here are
me considers best suited to accompany the
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the distance of the unit from the "form-up"

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s of your bomber units to their form-up air-
trade off bombs for fuel; so if you have plen-
m the form-up field, you should be able to
rrying fewer bombs. See p. 25 for reduced

Add Fighter Escorts (11) *Add fighter escort to the raid by selecting "Add Fighter Escorts" on the planning* Immediately, the bottom tab refreshes to show you a list of available fighter units. Each Allied fighter unit can be assigned up to 2 missions per day, but you must allow them the time to return home after the last mission. In order to give you an idea of which units have been assigned to early raids, a "#" appears on the fighter's line when assigning units. This indicates that this unit has already been assigned to an earlier raid and can be assigned for the current raid. Whatever group the lead bomber is attached to will also provide fighter escort. If the conditions mentioned above are not met, then the game does not allow you to assign escort units.

unit	aircraft		ready	exp	morale	range	delay	alt
56th FG	P-47C Thunderbolt	ce	42	73	68	121	0	20000
78th FG	P-47C Thunderbolt	ce	48	63	75	71	0	20000
82nd FG	P-47C Thunderbolt	he	48	60	68	66	0	22000

Select any and all fighter units on this list you wish to escort the bombers. When you first select them, they are set at "close escort" (see below).

As you select units for escort duty, notice that a green box, a green line, and a yellow box appear along the inbound/outbound flight paths of the raid. The green box indicates where the escort unit will form-up with the raid; the green line indicates the length of the unit's escort protection; the yellow box indicates where the unit will break off from the formation and fly home. To adjust these elements, *right-click anywhere along the inbound/outbound flight path.* The boxes and line will shift up and down the path accordingly. This adjustment changes the escort's delay time (see below).

Close Escort (ce): Close escort fighters protect the bombers by getting between them and the interceptors. This is a good tactic for preventing bombers from being attacked, but the escorts usually fight at a tactical disadvantage.

High Escort: High escort fighters fly above the raid and pounce enemy interceptors that fly nearby. High escort tactics will usually allow the escort fighters to engage the interceptors at a tactical advantage. High escort tactics are not very effective at preventing the bombers from being attacked, however. To change a fighter unit from close to "high escort," first select the high escort button appearing at the bottom of the tab, and then set the altitude you wish the fighters to fly above the bombers.

Once you've made these settings, then choose fighter units. The units you select will have "he" appear beside their ready aircraft, with their escort status and altitude marked accordingly.

Layering Your High Escorts: When setting escorts to higher altitudes, it's important to know how Axis interceptors will come in to attack the raid. Interceptors set to Direct tactics will try to attack a raid at [illegible] to 2,000 feet above the raid's altitude. Interceptors set to Bounce tactics will try to attack the raid at 4,000 to 5,000 feet above the raid's altitude, so you might want to set different altitudes for your high escort units in order to cover a larger area of sky above the bomber formation.

Fighter Ranges: An Allied fighter unit will only escort its bombers a distance of its fuel range. Once its fuel reaches the amount required to return home, it will break off and leave. *This is represented on the map as the "yellow" box which appears at the end of the escort's protection range (see below).* Drop tanks increase a fighter's escort range, but drop tanks are released as soon as the unit enters combat. Pay particular attention to your fighter ranges and assign escorts accordingly.

Delay: 20

Setting a Delay: In addition to setting fighter units as high escort, you may also set a time delay. The time delay is the number of minutes the escort will be delayed after the main unit departs. This allows different fighter groups to escort the raid on different segments of its flight path. *To set a delay, first set the delay time in the bottom right-hand corner of the escort tab, then select the fighter unit.* The unit's delay time will change to reflect your settings.

Another, and more efficient, way of setting delay is to adjust it directly on the inbound/outbound flight path. As mentioned earlier, each time you select a unit for escort, a green box, a green line, and a yellow box appears along the inbound/outbound flight path. The green box indicates where the escort unit will form-up with the raid; the green line indicates the length of the unit's escort protection; the yellow box indicates where the unit will break off and fly home. By right-clicking on the inbound/outbound path, you can adjust these elements to ensure your raid is protected along various stages of its flight. Adjusting these elements changes the escort's delay time.

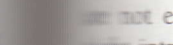
(12) *Once you are finished choosing fighter escorts, click "Done" on the bottom tab.* You have finished plotting a raid!

(13) *To begin plotting another bombing raid, select "New Mission" on the planning sub-tab.* This refreshes the tab and you are ready to repeat steps 2 through 11.

(14) Once you are finished plotting all bombing raids, *click "Done" at the bottom of the planning sub-tab to return to the main Planning Phase tab.*



Night Bombing Mission: Select this option to plan night bombing raids. The specific steps to plan night missions are exactly the same as regular bombing missions (see above). The only exception is that night bomber groups are not escorted by fighters; therefore, that step is skipped. However, night intruder missions may fly along the same path as a night bomber raid and occasionally shoot down an Axis night-fighter. So, night bombing missions may receive fighter escort, if you plan correctly. Note that there are three specific night scenarios in ***Bombing the Reich***: they're called "Nachtjagd," which means "night hunting" in German.



Night Intruder Mission: Select this option to plan night intruder raids. The specific steps to plan night intruder missions are exactly the same as regular bombing missions (see above). Night intruder missions are flown to disrupt the enemy's night air defense systems. They may fly along the path of friendly night bombers and attempt to engage enemy interceptors. They may patrol or bomb enemy airfields and attempt to shoot down enemy fighters that are trying to land. When planning night intruder missions, you'll notice that only one aircraft from each unit selected is assigned the mission. However, once you've assigned at least one aircraft, you'll have the option of changing that amount to "Multiple Planes." If you choose to do this, the game will immediately add more aircraft from the unit to the selected raid. Doing this has the night intruder planes flying in a stream to the target. But unlike the single aircraft night intruder mission, it doesn't patrol the location, but may attack it and then fly home. It's recommended that you use multiple plane intruders to fly alongside night bombers as added "escort." Also, you may employ the electronic warfare aircraft (such as the Fortress RCM) in this capacity as well. Doing so jams enemy radar or radio during flight.

Recon Mission: Select this option to plan photo reconnaissance missions. The specific steps to plan recon missions are exactly the same as regular bombing missions (see above). Recon missions are usually conducted by one aircraft or a small group. The purpose of launching recon missions is to fly over targets to take aerial photos in order to gauge the amount of damage your raids have delivered to the target. Recon missions can also be planned before flying over a target to get a better idea of where to attack, and it also updates to get production capacity numbers (which is important to know for industrial damage).

If there is no recon photo for a target, then it will be much more likely that bombers will fail to locate it. If photos are out-of -date (i.e., any recon photo over 2 days old), then the bomber planners will have less accurate information concerning air units stationed at the target (if an air field), the ground defenses, or damage. Also, if you can coordinate properly, you can run recon missions in the morning, have them return to home base, and then launch missions against the target they recon to get the benefit of updated information.

In other words, recon information on targets is immediately updated as soon as the recon unit arrives home. It's recommended that you run as many recon missions as you can to keep your intelligence up-to-date. It's also recommended that if you know you are going to hit a particular target soon, that you recon the target a day or two beforehand. Your staff is good at plotting recon missions.

When you order your staff to plot recon missions, the game will only plot recon missions against the primary target type you have selected. For example, if you selected "Primary Airfields" as the target type, your staff will only assign recons against primary airfields. All other staff orders (i.e., Plot a Raid Group, Plot all Raids, etc.), will give you a variety of different missions to different target types, with an emphasis on the primary target type you have selected. Recon missions do not damage their targets. However, you'll notice that recon mission lines on the Action Report will often show a damage amount. This is the amount of damage that the recon mission claims to be at the location indicated.

Fighter Sweep: Select this option to plan fighter sweeps. The specific steps to plan fighter sweeps are exactly the same as regular bombing missions (see above). A fighter sweep is one or more fighter units assigned to fly over a target, or to a specific spot in Europe, in an attempt to hinder Axis activity. Fighter sweeps conducted over airfields will strafe the airfield and (hopefully) destroy/damage Axis aircraft before they leave the ground. And, if planned carefully, fighter sweeps can also play an escort role, if you assign them to cover the area targeted for a bomber raid.

Effects of Interceptions and Ground Defe

effects associated with your raids being ground defenses. When Allied fighters enga begin to expend their fuel at four times t reach the fuel level that they need to return and fly home as "stragglers." Fighter bo then attack like "fighters." All other Allie fuel once intercepted; they defend thems to their target (unless they are shot d their targets, if still engaged, the depending upon the severity of the defenses). Also, if a formation is attack that it must make a morale check (see abort its mission, jettison its bombs, and he the check. This is where a unit's morale rat

Show All Paths: Select inbound/outbound flight plotted. This is a nice feature to use, bec idea of the flow of your attack, where you where they will all converge and then separ

Review Missions: Selec list of all plotted raids you may select either "Modify" to adjust planning sub-tab), or select "Cancel" The line, on which the canceled raid a list and is filled in if you add a new raid

num	lead unit	mis	ftr	bmr	depart	alt
4	1/812th Pathfinder	BOMB	138	24	06:00	20000
2	13th PRS	REC	0	1	10:58	43000
3	2/813th Pathfinder	BOMB	130	134	09:32	23000
4	13th PRS	REC	0	1	09:38	35000
5	13th PRS	REC	0	1	10:57	36000
6	13th PRS	REC	0	1	09:05	500
7	13th PRS	REC	0	1	10:27	34000

Mission: Select this option to plan photo-
issance missions. The specific steps to plan
e same as regular bombing missions (see
ually conducted by one aircraft or a small
ing recon missions is to fly over targets to
auge the amount of damage your raids have
missions can also be planned before flying
of where to attack, and it also updates the
bers (which is important to know for

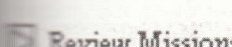
or a target, then it will be much more like
cate it. If photos are out-of -date (i.e., any
, then the bomber planners will have less
g air units stationed at the target (if any) or
r damage. Also, if you can coordinate to
issions in the morning, have them return
missions against the target they recommend
formation.
rmation on targets is immediately updated
s home. It's recommended that you run a
n to keep your intelligence up-to-date. If
know you are going to hit a particular tar-
rget a day or two beforehand. Your staff is
s.
to plot recon missions, the game will only
primary target type you have selected. For
ary Airfields" as the target type, your staff
primary airfields. All other staff orders (i.e.,
ls, etc.), will give you a variety of different
s, with an emphasis on the primary targets.
n missions do not damage their targets
on mission lines on the Action Report will
. This is the amount of damage that the
he location indicated.

Sweep: Select this option to plan fighter
The specific steps to plan fighter sweeps
bombing missions (see above). A fighter
its assigned to fly over a target, or to a spe-
npt to hinder Axis activity. Fighter sweeps
ll strafe the airfield and (hopefully)
before they leave the ground. And, if
s can also play an escort role, if you assign
for a bomber raid.

The Effects of Interceptions and Ground Defenses on Raids: There are numerous effects associated with your raids being intercepted by Axis units and ground defenses. When Allied fighters engage the enemy, they immediately begin to expend their fuel at four times the normal rate, and when they reach the fuel level that they need to return home, they break off the attack and fly home as "stragglers." Fighter bombers drop their bombs, and then attack like "fighters." All other Allied aircraft do not expend extra fuel once intercepted; they defend themselves normally, and they continue to their target (unless they are shot down or damaged). Once they reach their targets, if still engaged, their bombing accuracy is reduced, depending upon the severity of the engagement (including ground defenses). Also, if a formation is attacked in such an aggressive manner that it must make a morale check (see p. 46), the whole group will abort its mission, jettison its bombs, and head straight for home, if it fails the check. This is where a unit's morale rating comes into play.



Show All Paths: Select this option to review all inbound/outbound flight paths of all raids currently plotted. This is a nice feature to use, because it gives you a good visual idea of the flow of your attack, where your raids are coming from, and where they will all converge and then separate, as they reach Europe.



Review Missions: Select this option to review a list of all plotted raids. Once you are in this screen, you may select either "Modify" to adjust a raid (this takes you to the raid's planning sub-tab), or select "Cancel" to remove the raid completely. The line, on which the canceled raid appeared, remains in the mission list and is filled in if you add a new raid later.

num	lead unit	mis	ftr	bmr	depart	alt	TOT	type	target
1	1/812th Pathfinder	BOMB	138	24	06:00	20000	08:18	OILR	Merkwiller
2	13th PRS	REC	0	1	10:58	43000	12:42	BBFAC	Erkner
3	2/813th Pathfinder	BOMB	130	134	09:32	23000	12:21	BBFAC	Vereinigte #2
4	13th PRS	REC	0	1	09:38	35000	11:00	BBFAC	Vereinigte #1
5	13th PRS	REC	0	1	10:57	36000	12:33	BBFAC	Engelsdorf
6	13th PRS	REC	0	1	09:05	500	09:56	BBFAC	Elberfeld
7	13th PRS	REC	0	1	10:27	34000	11:49	BBFAC	Kugelfischer

Raid number and Lead Unit: The raid number and lead unit are listed first.

Type: This indicates the mission type. BOMB = bomber (night bombers also); FS = fighter sweep; NI = night intruder; REC = recon.

Ftr: The number of fighters assigned.

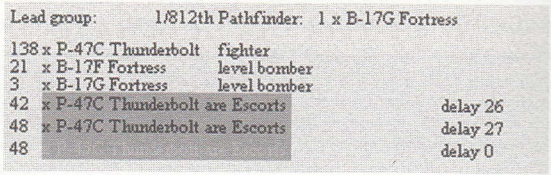
Bmr: The number of bombers or recon aircraft assigned. Also, fighter bombers are classified as bombers for game purposes. Depart: The time the raid is due to complete forming up and launch.

Alt: The assigned altitude.

Time over Target (TOT): The time the raid is due to arrive over the target. Bomber units that suffer losses may turn back before reaching the target. Bomber units may fail to locate a target due to cloud cover (see p. 78) or poor intelligence of the target area (i.e., no recon photo). It's also important to note that a raid's TOT may change a few times as you are planning the raid. As you begin to plan the raid, the game tries to give you an estimated TOT. But once the raid is finalized, the TOT will change to reflect a more accurate time. However, if you "modify" the raid, the TOT may change again. Don't consider the TOT figure as a perfect and exact time the raid will reach its destination, but rather as a good "ballpark" figure.

Target: The name and type of the primary target.

Modifying Escort Delay: Once you have selected a raid to modify, you may adjust the delay of any and all escort fighters attached to that raid. The raid detail tab opens at the bottom, and all escorts are listed.



To adjust the delay,

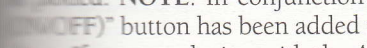
(1) Select the escort you wish to modify by clicking on its name. The escort's green box, green line, and yellow box appear along the raids flight path.

(2) Once these elements appear, right-click on the inbound/outbound flight path to change the escort unit's delay time. After adjusting the delay, clicking another unit or exiting changes the unit's delay.

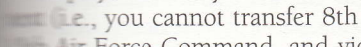




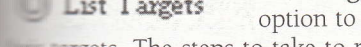
Auto-Plan Missions: If this feature is toggled ON, your staff will auto-plot all your missions for the upcoming day, based on what it thinks it can plot comfortably. The plotted raids appear immediately in the "review missions" list, and you may modify them normally. If this feature is left toggled ON, then in the next Raid Planning Phase, your missions will already be plotted. **NOTE**: In conjunction with this feature, a "Continuous Play (ON/OFF)" button has been added to the Reaction Phase tab for the Allied player. If you are playing with the Auto-Plan Missions feature toggled ON, then you may turn on continuous play to have the game continue running Reaction Phases until it reaches a point where it cannot plot raids.



Move Air Units: The steps to take to review this information are the same as those listed under the Axis function. See p. 35 for details. The only difference here for the Allied player is that you cannot transfer units from one command to the next (i.e., you cannot transfer 8th Air Force B-17s to any airfields under 15th Air Force Command, and vice-versa). If you try, the game will just ignore the request.



List Air Units (information-only tab): Select this option to review your air units. The steps to take to review this information are the same as those listed under the Axis function. See p. 45 for details.



List Targets (information-only tab): Select this option to review damage and other details about Axis targets. The steps to take to review this information are the same as those listed under the Axis function. See p. 41 for details. However, there are some things that are different for the Allied player, if you select a specific target on the list to review its details. See p. 84 for more information.



END PHASE BUTTON: *When you are finished with your Movement Phase, press the "End Phase" button to enter the Reaction Phase.*

Allied Reaction Phase

The Allied player starts the Reaction Phase by clicking the "START" button on the Reaction Phase tab. During this phase, you watch the progress of your raids as planned in your Raid Planning Phase. You may pause the Reaction Phase for whatever reason by clicking the "STOP" button, but you cannot change or affect the outcome of the raids.

The raids are launched as per your plans, and their success (or failure) is determined by the computer. In a sense, you're in the same position as the real mission planners were during World War II: once their raids were launched, they had little or no further control over them and could only wait until the bombers returned to learn the outcome.

Once all raids are finished, the Reaction Phase ends, and you are taken to the Intelligence Briefing Phase (see below).

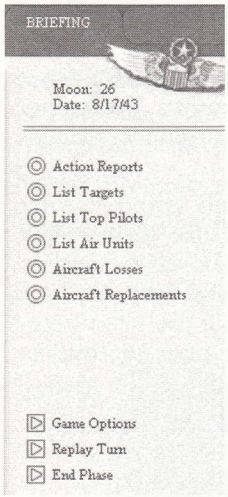
During the Reaction Phase, however, you may review your missions by selecting "Review Missions" on the Reaction Phase tab. You may also change Game Option settings, adjust game speed, etc.

Full Screen Mode: As the Allied player, you can also set the Reaction Phase to full screen mode, and it's highly recommended that you do so. See p. 49 for more information.

Allied Intelligence Briefing Phase

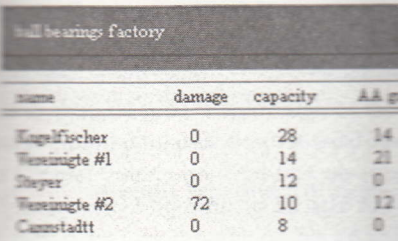
The Allied Intelligence Briefing Phase is where the results of the day's missions are reviewed by the Allied Player. The selections here are "information-only" features.

Intelligence Briefing Phase Tab



Action Reports (information-only tab): Select this option to review all the raids you've conducted that the day and their results. The steps to take to review this information are the same as those listed under the Axis function. See p. 40 for details. And, like the Axis action report tab, the information here may be inaccurate. The Action Report represents an immediate "results sheet" that your staff hands to you after a day's bombing, and so the number of reported Allied fighters shot down, the actual target damage amount, etc., might be exaggerated. Review the other databases in the Intelligence Briefing Phase to get a fuller and more accurate assessment on how your units performed their day's missions.

List Targets (information-only tab): Select this option to review details about Axis industries and airfields. The steps to take to review this information are the same as those listed under the Axis function. See p. 41 for details. The difference, however, is the kinds of information displayed. First, as the Allied player, you can never access a target location's details tab. You may select a target type on the first tab that appears and review a list of specific locations, but that's it.



Name: This is the name of the target (e.g., Ste

Damage: This is the percentage of damage to t not necessarily accurate. Its accuracy is based of the site (see below). If the target is an airfield age is divided between three categori Communication areas. The damage listed her the runway and service area damage, and its a the recon photo.

Fighters/Capacity: This column will ind number of enemy fighters present, or the indu For factories and other industrial targets, th capacity; for rail yards this represents the size/ units, this represents the number of aircraft there.

AA Guns: This is the number of AA guns at t

Balloons: This is the number of balloon barra

Last Photo: Unlike your Axis counterpart, you the age of the last recon photo taken of that lo the column, you have not taken a recon pho appearing here tells you how old (in days) the then "1" appears beside the target, the recon ph photo" is considered 1 or 2 days old.

Any photo older than that means that your not reliable. It's important, then, to try to run often as possible, to keep your photos current. You cannot tell how damaged the target is (targ time, see p. 110), or how many air units or grou

Also, targets without any recon photo at all to locate and destroy. Once you've run at least o get, then any missions against that target in th of finding and targeting the location.

the Reaction Phase ends, and you
hase (see below).
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Allied player, you can also set the
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n Reports **Action Reports (information-only tab):** Select
review all the raids you've conducted
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review details about Axis industries
iew this information are the same as
See p. 41 for details. The difference,
displayed. First, as the Allied player,
n's details tab. You may select a target
nd review a list of specific locations,

ball bearings factory

name	damage	capacity	AA guns	balloons	last photo
Kugelfischer	0	28	14	0	1
Vereinigte #1	0	14	21	0	1
Steyer	0	12	0	0	43
Vereinigte #2	72	10	12	0	1
Cannstadtt	0	8	0	0	55

Name: This is the name of the target (e.g., Steyer Ball Bearings Factory).

Damage: This is the percentage of damage to the target. The number here is not necessarily accurate. Its accuracy is based on the age of the recon photo of the site (see below). If the target is an airfield, remember that airfield damage is divided between three categories: Runway, Service and Communication areas. The damage listed here for airfields is an average of the runway and service area damage, and its accuracy is based on the age of the recon photo.

Size/Fighters/Capacity: This column will indicate the size of the target, the number of enemy fighters present, or the industrial capacity of the location. For factories and other industrial targets, this represents the production capacity; for rail yards this represents the size/importance of the yard; for airfields, this represents the number of aircraft ("fighters") currently stationed there.

AA Guns: This is the number of AA guns at the location.

Balloons: This is the number of balloon barrages at the location.

Last Photo: Unlike your Axis counterpart, your Target List has a column for the age of the last recon photo taken of that location. If a "none" appears in the column, you have not taken a recon photo of that target. The number appearing here tells you how old (in days) the recon photo is. So, if the number "1" appears beside the target, the recon photo is one day old. A "current photo" is considered 1 or 2 days old.

Any photo older than that means that your intelligence of that location is not reliable. It's important, then, to try to run recon missions (see p. 80) as often as possible, to keep your photos current. Without current recon photos, you cannot tell how damaged the target is (targets do repair themselves over time, see p. 110), or how many air units or ground defenses are located there.

Also, targets without any recon photo at all are difficult (if not impossible) to locate and destroy. Once you've run at least one recon mission against a target, then any missions against that target in the future have a higher chance of finding and targeting the location.

The Purpose of Reviewing Target Information: It's absolutely necessary for the Allied player to conduct good damage assessment in order to determine how to prosecute his attack. You must know how successful your attacks have been in order to determine if your strategy is working. What targets are you attacking? How are you attacking them? What intelligence (i.e., recon information) do you have on enemy targets? It's very likely that you'll coordinate your attacks according to your victory conditions. Review ***Bombing the Reich's*** victory conditions (see p. 89) carefully to know which industries should be targeted most often. Although there are various visual preferences you can set to see how much damage a particular target has sustained (see p. 18), you still need to review the Target List often to fully understand how much damage your mighty Allies are dishing out.

List Top Pilots **List Top Pilots (information-only tab):** Select this option to review a listing of your top pilots. The steps to take to review this information are the same as those listed under the Axis function. See p. 43 for details. As the campaign progresses, the game begins to promote pilots and adjust their attributes. Units with good pilots perform their duties better, so it's important to review your pilot information often and know which squadrons have the top guns.

List Air Units **List Air Units (information-only tab):** Select this option to review your units. The steps to take to review this information are the same as those listed under the Axis function. See p. 45 for details. The information displayed here shows your units' morale levels, damage levels, etc.

Aircraft Losses **Aircraft Losses (information-only tab):** Select this option to review all the aircraft that have been destroyed (on both sides) for the day's raids and for the entire campaign. The steps to take to review this information are the same as those listed under the Axis function. See p. 48 for details.

Aircraft Replacements **Aircraft Replacements (information-only tab):** Select this option to review a listing of all Allied aircraft and their replacements. The steps to take to review this information are the same as those listed under the Axis function. See p. 48 for details.

Allied Replacement Aircraft: Unlike the A replacements come from a steady stream of off-m campaigns, you receive replacement aircraft e know your replacement rate.

Aircraft Type and # of Replaceme

Beaufighter VIF	2	Spitfire XIV	
Mosquito II	1	Typhoon	
Mosquito XIII	1	Tempest	
Fortress RCM	0	P-39	
Baltimore V	3	P-40	
Mosquito RCM	1	P-38G	
Liberator RCM	0	P-38J	
Wellington RCM	1	F-5A	
Wellington III	1	F-5C	
Wellington X	2	P-47C	
Stirling RCM	0	P-47D	
Stirling III	4	A-36	
Halifax RCM	0	P-51B	
Halifax I	2	P-51D	
Halifax III	2	F-5C	
Lancaster I	4	P-61A	
Lancaster III	2	A-20B	
Mosquito FB.VI	1	A-20G	
Mosquito IV	1	B-25D	
Mosquito XVI	1	B-25J	
Spitfire IV	1	B-26B	
Spitfire XI	1	B-26G	
Spitfire FR.XIV	0	A-26B	
Mosquito PR.XVI	1	B-17F	
Mustang I	2	B-17G	
Hurricane II	4	B-24D	
Spitfire Vb	2	B-24J	
Spitfire IX	6		

Note: These replacement rates shift to '44 rates o

Allied Replacement Aircraft: Unlike the Axis player, your aircraft replacements come from a steady stream of off-map industrial sources. In [illegible] campaigns, you receive replacement aircraft each turn. Refer to the list below to know your replacement rate.

Aircraft Type and # of Replacements

Beaufighter VIF	2	Spitfire XIV	0
Mosquito II	1	Typhoon	3
Mosquito XIII	1	Tempest	0
Fortress RCM	0	P-39	3
Baltimore V	3	P-40	6
Mosquito RCM	1	P-38G	9
Liberator RCM	0	P-38J	12
Wellington RCM	1	F-5A	1
Wellington III	1	F-5C	0
Wellington X	2	P-47C	3
Stirling RCM	0	P-47D	12
Stirling III	4	A-36	1
Halifax RCM	0	P-51B	6
Halifax I	2	P-51D	0
Halifax III	2	F-5C	1
Lancaster I	4	P-61A	1
Lancaster III	2	A-20B	4
Mosquito FB.VI	1	A-20G	0
Mosquito IV	1	B-25D	4
Mosquito XVI	1	B-25J	0
Spitfire IV	1	B-26B	6
Spitfire XI	1	B-26G	0
Spitfire FR.XIV	0	A-26B	0
Mosquito PR.XVI	1	B-17F	9
Mustang I	2	B-17G	9
Hurricane II	4	B-24D	6
Spitfire Vb	2	B-24J	6
Spitfire IX	6		

Note: These replacement rates shift to '44 rates on January 1st, 1944 (see below).

Playing the Game

In 1944 campaigns, you receive replacement aircraft each turn. Refer to the list below to know your replacement rate.

Aircraft Type and # of Replacements

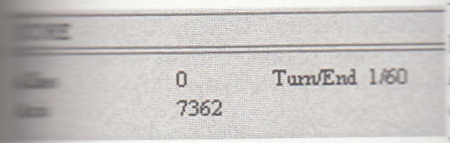
Beaufighter VIF	2	Spitfire XIV	3
Mosquito II	0	Typhoon	3
Mosquito XIII	2	Tempest	3
Fortress RCM	1	P-39	3
Baltimore V	2	P-40	3
Mosquito RCM	1	P-38G	3
Liberator RCM	1	P-38J	3
Wellington RCM	1	F-5A	3
Wellington III	0	F-5C	3
Wellington X	3	P-47C	3
Stirling RCM	1	P-47D	3
Stirling III	2	A-36	3
Halifax RCM	1	P-51B	3
Halifax II	0	P-51D	3
Halifax III	6	F-5C	3
Lancaster I	0	F-5D	3
Lancaster III	6	P-61A	3
Mosquito FB.VI	1	A-20B	3
Mosquito IV	0	A-20G	4
Mosquito XVI	2	B-25D	3
Spitfire IV	0	B-25J	4
Spitfire XI	1	B-26B	3
Spitfire FR.XIV	1	B-26G	4
Mosquito PR.XVI	1	A-26B	2
Mustang I	2	B-17F	3
Hurricane II	2	B-17G	25
Spitfire Vb	0	B-24D	3
Spitfire IX	8	B-24J	25

End Phase **END PHASE BUTTON:** When you are finished with your Intelligence Briefing Phase, press the "End Phase" button to enter the next Raid Planning Phase.

Winning the Game

Now that you've read Section VI thoroughly and [illegible] *TalonSoft's 12 O'Clock High: Bombing* know how to win. Campaigns (or scenarios) [illegible] types: Strategic Bombing Campaigns. In all of these campaigns, the bur[illegible] player. He is the attacker. The Axis p[illegible] because of that, he merely has to prevent the A[illegible] victory conditions (esier said than done, of c[illegible] known set of victory conditions. Below is a fu[illegible] ways in the game.

The Strategic Bombing Campaigns



These campaigns, the Allied player much scor[illegible] event categories: Air Superiority, Industrial [illegible] "Blitz" bombing). Below are descriptions on h[illegible]

Scoring Air Superiority Points

Air Superiority At the end of each [illegible] Superiority" level show[illegible] obtained by taking the total number of "ser[illegible] dividing it by the total number of "serviceab[illegible] Allie aircraft / Axis serviceable aircraft = [illegible] number is generated using only the active ai[illegible] are playing. Simply put, as air combat occurs [illegible] the end of each turn, the losses are calculated [illegible] obtained.

ive replacement aircraft each turn. Refer
eplacement rate.

e and # of Replacements

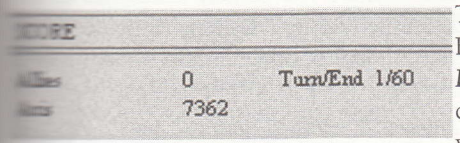
.2	Spitfire XIV	3
.0	Typhoon	1
.2	Tempest	2
.1	P-39	1
.2	P-40	1
.1	P-38G	1
.1	P-38J	12
.1	F-5A	1
.0	F-5C	1
.3	P-47C	1
.1	P-47D	16
.2	A-36	1
.1	P-51B	6
.0	P-51D	12
.6	F-5C	1
.0	F-5D	1
.6	P-61A	1
.1	A-20B	1
.0	A-20G	4
.2	B-25D	1
.0	B-25J	4
.1	B-26B	1
.1	B-26G	4
.1	A-26B	2
.2	B-17F	1
.2	B-17G	15
.0	B-24D	1
.8	B-24J	15

ASE BUTTON: When you are finished
r Intelligence Briefing Phase, press the
next Raid Planning Phase.

VI. Winning the Game

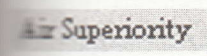
Now that you've read Section VI thoroughly and understand the mechanics of ***TalonSoft's 12 O'Clock High: Bombing the Reich***, it's important to know how to win. Campaigns (or scenarios) in this game are of two different types: Strategic Bombing Campaigns and Ground Support Campaigns. In all of these campaigns, the burden of victory lies with the Allied player. He is the attacker. The Axis player is the defender, and because of that, he merely has to prevent the Allied player from achieving victory conditions (esier said than done, of course). Each campaign has its own set of victory conditions. Below is a full description of all the campaigns in the game.

The Strategic Bombing Campaigns



There are 10 Strategic Bombing Campaigns in ***Bombing the Reich***. They cover various phases of the air war from 1943 to 1945. In these campaigns, the Allied player much score victory points in three different categories: Air Superiority, Industrial Damage, and Terror (urban "blitz" bombing). Below are descriptions on how to score these points.

Scoring Air Superiority Points



At the end of each Reaction Phase, the "Air Superiority" level shown on the bottom tab is obtained by taking the total number of "serviceable" Allied aircraft and dividing it by the total number of "serviceable" Axis aircraft (Allied serviceable aircraft / Axis serviceable aircraft = Air Superiority Level). This number is generated using only the active air groups in the scenario you are playing. Simply put, as air combat occurs, both sides take losses, so at the end of each turn, the losses are calculated and an Air Superiority level is obtained.

Scoring Industrial Damage Points (Allied Player Only)

Industry Damage Industrial Damage Points are obtained by the Allied player for reducing the Axis Industrial Output level by bombing factories (including oil centers), railyards and ports. The industrial damage "level" number (located on the bottom tab) indicates the overall damage level of Axis industry, and is obtained by taking 35,000 (long campaigns and Nachtjagd campaigns), or 38,000 (Transportation and Big Week campaigns), or 42,000 (Oil Offensive campaigns) minus the current Axis industry level and dividing by 500 (35,000 or 38,000 or 42,000 - Axis Output)/500 = Industrial Damage Level). So, for example, as soon as the Allied player knocks the Axis Total Industrial Output down under 34,500, the Industrial Damage Level reaches 1; knock it below 34,000, the number goes to 2, etc.

Damaging Critical Industries: There are certain industries in the game which are classified as "critical industries." Damage to these industries will begin to reduce the effectiveness of other industries and subsequently drive down their point values.

When a Critical Industry's Output (CIO-indicated on the List Targets tab under the "total" column) is reduced below its 'critical level' (CIL), then "dependent" industry outputs (DIO) will be adjusted down using the following equation [Dependent Industry Output Adjustment — DIO = DIO x (CIO+50/CIL+50)]

Critical Industry	Critical Level(CIL)	Dependent Industries
electric power	2,000	all other industries
chemical	500	oil refineries, and rubber factories
steel	300	armaments
ball bearings	120 (500)	aircraft assembly (armaments)
rubber	500	armaments
aluminum	200	aircraft assembly

C

Terror Points (Allied Player Only)

Terror Terror points are scored by k mile of urban area (i.e., one p The Allied player receives 1 point per e to each square mile of urban area. The A by completely knocking out one square m

The Terror number on the bottom tab repr to urban areas, and is obtained by di by 10,000. Once the terror points reach increases to 1; once the terror points reach 2 increases to 2, etc.

During play, the only way you can see urba to click on the "Urban" button on the Prefe remove all other targets except the urban areas. I damage at all, small dots of yellow or red (fire) a yellow, the more heavily damaged that urban are fires burning in that area, and these fires can bu spread to other connecting urban areas.

No-Point targets

When playing the Strategic Bombing Campaigns, hitting radar sites and airfields, and no industrial p ing U-boat pens or V-Weapon sites. However, shouldn't consider hitting these targets. Especia ones, these targets are vital to the Axis defense.

The Campaigns

Below is a list of the Strategic bombing Campaigns paigns, the Allied player must score points across order to achieve victory. The points the Allied pla ed on the bottom tab as "to win." At the end of score is recalculated. If the Allied player's score points "to win," he wins. If at the end of the cam has not scored enough points to win, the Axis pla

Scoring Terror Points (Allied Player Only)

Terror

Terror points are scored by knocking out each square mile of urban area (i.e., one pixel on the far zoom-out mode). The Allied player receives 1 point per each percentage point of damage to each square mile of urban area. The Allied player receives 100 points by completely knocking out one square mile.

The Terror number on the bottom tab represents the "level" of all damage to urban areas, and is obtained by dividing the terror points scored by 10,000. Once the terror points reach 10,000, the terror level increases to 1; once the terror points reach 20,000, the terror level increases to 2, etc.

During play, the only way you can see urban damage on the map is to click on the "Urban" button on the Preference tool bar. This will remove all other targets except the urban areas. If the urban area has any damage at all, small dots of yellow or red (fire) appear. The brighter the yellow, the more heavily damaged that urban area is. Red dots indicate fires burning in that area, and these fires can burn for a time, and also spread to other connecting urban areas.

No-Point targets

When playing the Strategic Bombing Campaigns, no points are scored for hitting radar sites and airfields, and no industrial points are scored for hitting U-boat pens or V-Weapon sites. However, that doesn't mean you shouldn't consider hitting these targets. Especially airfields and radar sites, these targets are vital to the Axis defense.

The Campaigns

Below is a list of the Strategic bombing Campaigns. For each of these campaigns, the Allied player must score points across all three categories in order to achieve victory. The points the Allied player needs to win is listed on the bottom tab as "to win." At the end of each turn, the current score is recalculated. If the Allied player's score equals or exceeds the points "to win," he wins. If at the end of the campaign the Allied player has not scored enough points to win, the Axis player wins.

Winning The Game

(1) Introductory Scenario: This one-day campaign (1 turn) is a tutorial scenario for beginning players. The scoring system for this campaign works as described above, with the following exceptions: You score triple points for hitting ball bearings factories. See p. 8 for a run-through of this scenario.

(2) Nachtjagd I: [8/22/43 - 10/2/43] This six-week campaign (42 turns) depicts the period right after the destruction of Hamburg, when the British were trying to exploit the ability to jam German radar. This is a night campaign using only Bomber Command. The scoring system for this campaign works as described above with the following exceptions: You score triple terror points for hitting urban areas, and normal points for all other targets. To see how many points you need to win as the Allied player, see the "to win" display on the bottom tab.

Note: You can also play a shorter version of this campaign by selecting "Change to Short Scenario" on the Campaign Selection Screen.

(3) Nachtjagd II: [2/16/44 - 4/4/44] This six-week campaign (42 turns) depicts the second phase of the British night bombing campaign. During this period, the Germans developed their "tame boar" interception tactics and their SN-2 radar which was immune to Window jamming. This is a night campaign using only Bomber Command. The scoring system for this campaign works as described above with the following exceptions: You score triple terror points for hitting urban areas, and normal points for all other targets. To see how many points you need to win as the Allied player, see the "to win" display on the bottom tab.

Note: You can also play a shorter version of this campaign by selecting "Change to Short Scenario" on the Campaign Selection Screen.

(4) Nachtjagd III: [7/16/44 - 8/26/44] This six-week campaign (42 turns) depicts the third phase of the British night bombing campaign. This reflects the beginning of a very successful British effort to jam German radar and radios using RCM and Night Intruder aircraft. This is a night campaign using only Bomber Command. The scoring system for this campaign works as described above with the following exceptions: You score triple terror points for hitting urban areas, and normal points for all other targets. To see how many points you need to win as the Allied player, see the "to win" display on the bottom tab.

Note: You can also play a shorter version of this campaign by selecting "Change to Short Scenario" on the Campaign Selection Screen.

(5) **Big Week:** [2/20/44 - 2/26/44] This one-week campaign (7 turns) depicts a period of good weather, where the 8th and 15th Air Forces could coordinate their attack. Their primary targets during this period were aircraft production facilities (i.e., aircraft factories, avionics factories, and engine factories). The scoring system for this campaign works as described above with the following exceptions: You score double points for hitting aircraft, avionics, and engine factories, and normal points for all other targets. To see how many points you need to win as the Allied player, see the "to win" display on the bottom tab.

(6) **Oil Offensive I:** [6/6/44 - 6/12/44] This one-week campaign (7 turns) depicts the 15th Air Force and its assault against the oil industries of Eastern Europe. The scoring system for this campaign works as described above with the following exceptions: You score triple points for hitting oil storage sites, oil refineries, and synthetic fuel plants, and normal points for all other targets. To see how many points you need to win as the Allied player, see the "to win" display on the bottom tab.

(7) **Oil Offensive II:** [6/16/44 - 7/27/44] This six-week campaign (42 turns) depicts the 8th and 15th Air Forces in a combined assault against oil industries. The campaign area covers most of Europe. The scoring system for this campaign works as described above with the following exceptions: You score triple points for hitting oil storage sites, oil refineries, and synthetic fuel plants, and normal points for all other targets. To see how many points you need to win as the Allied player, see the "to win" display on the bottom tab.

Note: You can also play a shorter version of this campaign by selecting "Change to Short Scenario" on the Campaign Selection Screen.

(8) **Full Campaign 43:** This 700 Turn full campaign depicts the entire conflict from August 17, 1943 to the end of the war. As the Allied player, you score points as described above To see how many points you need to win as the Allied player, see the "to win" display on the bottom tab. In addition to scoring points as described above, Axis "ground troops" are present in this campaign (see p 98). However, you do not score points directly for damaging them. But by reducing their effectiveness, you may excellerate the Allied ground advance which results in the capture and "permanent" destruction of Axis industry. In addition, "mandatory targeting" is in effect (see p. 97).

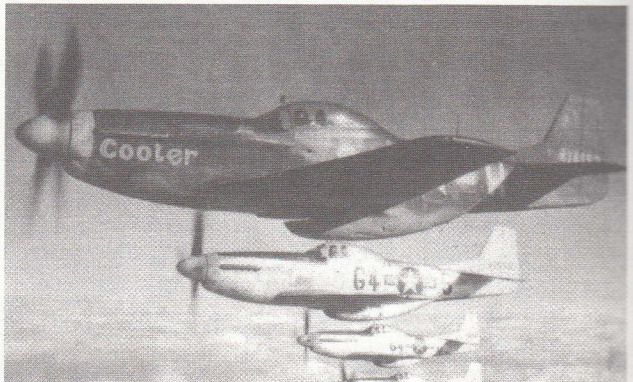
Score Checks for Early Ending: At the end of each 31 turns of play the game looks to see if your total points is less than the number of months played times 2. So if you've played 10 (310 turns) months and you have less than 20 points, you lose and the game ends.

(9) Full Campaign 44: This 500 Turn full campaign depicts the start of the period where allied escorts were able to protect their bombers deep into Axis territory. As the Allied player, you must score points as described above. To see how many points you need to win as the Allied player, see the "to win" display on the bottom tab. In addition to scoring points as described above, Axis "ground troops" are present in this campaign (see p. 98).

However, you do not score points directly for damaging them. But by reducing their effectiveness, you may excellerate the Allied ground advance which results in the capture and "permanent" destruction of their industry. In addition, "mandatory targeting" is in effect (see p. 97).

Score Checks for Early Ending: At the end of each 31 turns of play the game looks to see if your total points is less than the number of months played times 2. So if you've played 10 (310 turns) months and you have less than 20 points, you lose and the game ends.

(10) Jet Age 44: This "hypothetical" 500 Turn full campaign covers the same period as the regular 44 campaign, but shows what might have happened if the Germans had received the ME-262 jet fighters early. As the Allied player, you must score points as described under the full 44 campaign.



The Ground Support Campaigns

SCORE		
Allies	0	To
Axis	7362	

There are 3 Ground Support Campaigns in Bo conflicts, the Allied player is in support of his g their various invasions of the Reich. Like Campaigns, the allied player has the burden o other campaigns, he wins by overcoming a sev player begins with a score. The Allied player h end of any Reaction Phase to win. Also, Ground "ground troops." See p. 98 for more details descriptions.

(1) Avalanche: [8/17/43 - 10/15/43] This turns) depicts the bombing offensive used in Italy. Avalanche is a "ground support" campaig ground troops are present. To win, the Allied mination targets (railyards and ports), airfi ground forces. Both players also get points for and the Axis player receives points for having at certain times during play. The scoring is calc

Destroying Enemy Aircraft: Allied player ge destroyed; Axis player gets 2 poin and 3 points for all other plane ty

Serviceable Aircraft: The Axis player gets 1 po in Southern Italy (below y-coordi airfields with less than 50 points find the general location of this mouse arrow over targets in Italy dinate displayed.

Ground Troop Strength: The Axis player re ground unit strength of any tr 1,000 (just south of Rome). For ex with a total of 800 strength belo Axis player receives 800 points fo turn, troop strength is calculated is adjusted accordingly.

The Ground Support Campaigns

SCORE		
Allies	0	Turn/End 1/60
Axis	7362	

There are 3 Ground Support Campaigns in ***Bombing the Reich***. In these conflicts, the Allied player is in support of his ground troops as they make their various invasions of the Reich. Like the Strategic Bombing Campaigns, the allied player has the burden of victory; but unlike those other campaigns, he wins by overcoming a severe point deficit. The Axis player begins with a score. The Allied player has to beat that score at the end of any Reaction Phase to win. Also, Ground Support Campaigns have "ground troops." See p. 98 for more details. Below are the scenario descriptions.

(1) Avalanche: [8/17/43 - 10/15/43] This two-month campaign (60 turns) depicts the bombing offensive used in support of the invasion of Italy. Avalanche is a "ground support" campaign, which means that Axis ground troops are present. To win, the Allied player must attack transportation targets (railyards and ports), airfields, radar stations, and ground forces. Both players also get points for destroying enemy aircraft and the Axis player receives points for having troops in certain locations at certain times during play. The scoring is calculated as follows:

Destroying Enemy Aircraft: Allied player gets 1 point per Axis a/c destroyed; Axis player gets 2 points per Allied fighter plane, and 3 points for all other plane types.

Serviceable Aircraft: The Axis player gets 1 point per serviceable aircraft in Southern Italy (below y-coordinate 950) located on any airfields with less than 50 points of service damage. You can find the general location of this coordinate by moving the mouse arrow over targets in Italy and referring to the coordinate displayed.

Ground Troop Strength: The Axis player receives points for effective ground unit strength of any troops below y-coordinate 1,000 (just south of Rome). For example, if there are troops with a total of 800 strength below y-coordinate 1,000, the Axis player receives 800 points for them. At the end of each turn, troop strength is calculated and the Axis score is adjusted accordingly.

Capturing Axis Buildings/Airfields: During play, the invasion of Italy will occur and the Allied player will eventually overrun Italian buildings and airfields. The invasion begins in Southern Italy and moves up the peninsula until it hits the Gustav Line where is grinds to a halt. As areas are overrun, the captured buildings disappear to reflect the Allied advance. Axis airfields, however, stay on the map and turn gray. One week later (7 turns), these captured airfields will turn white, to show that they are fully operational and can maintain Allied air units. Once this happens, the Allied player can transition units into these fields and begin using them normally. The Allied player scores 100 points per airfield captured. The Allied player receives 50 points times capacity of any captured buildings (50 x capacity).

Service Damage to Airfields: The Allied Player receives 1 point for every 2 points of Service Damage to airfields anywhere on the map. So, if an airfield has 90 points of Service Damage the Allied player receives 45 points.

Industrial Damage Points: The Allied player receives 1 point for every 2 points of damage times capacity of any industrial targets, including railyards.

(2) Overlord I: [5/1/44 - 8/31/44] This four-month campaign (120 turns) depicts the bombing offensive used in support of the invasion of France. The first five weeks of the campaign depict the softening up of Northern France prior to the invasion of Normandy, while the last part of the campaign depicts the Allied air forces in tactical support of the army's advance. Overlord I is a "ground support" scenario, which means that Axis ground troops are present. The scoring system for Overlord I is the same as Avalanche (see above) with the following exceptions:

Axis Points: The Axis player receives 1 point per serviceable aircraft in Belgium and France (west of x-coordinate 500). *You can find the general location of this coordinate by moving the mouse arrow over targets in Belgium/France and referring to the corrdinate displayed.*

Ground Troop Strength: The Axis player receives points for all troop strength left on the map at the end of play.

irfield Damage: Same as Avalanche scori

andatory Targeting: There is "mandato scenario (see below).

(3) Overlord II: [6/4/44 - 8/31/44] Th turns) is basically the same as Overlord I, terwards. The softening up of Axis defens mping right into tactical support. The s Overlord I, but many targets begin this below). Bomber Command is not present "mandatory targeting" in place (see below).

e-Damaged Targets

t the beginning of most campaigns, some This reflects prior bombing attacks. These points are factored into the Allied player's st normally.

andatory Targeting

Mandatory Targeting reflects the political commanders during the air war. During campaigns, certain commands may be f types. A message is displayed to show the ning of his Planning Phase. The mandatory

U-Boat Pens
V-Weapon Sites
Avalanche Targets (see p. 110)
Overlord Targets (see p. 109)

Pre-emptive Strikes: To prevent th mandatory targeting restrictions against yo pre-emptive strikes against the following t

- By destroying U-boat Facto capacity down under 1,000), U-Boat pens.
- By destroying V-Weapon F capacity down under 200), y Weapon Sites.

Airfield Damage: Same as Avalanche scoring.

Mandatory Targeting: There is "mandatory targeting" in place for this scenario (see below).

(3) Overlord II: [6/4/44 - 8/31/44] This three-month campaign (89 turns) is basically the same as Overlord I, but it begins about five weeks afterwards. The softening up of Axis defenses has already begun; you are jumping right into tactical support. The scoring system is the same as Overlord I, but many targets begin this campaign with damage (see below). Bomber Command is not present in Overlord II, and there is "mandatory targeting" in place (see below).

Pre-Damaged Targets

At the beginning of most campaigns, some targets have already been hit. This reflects prior bombing attacks. These industrial and terror damage points are factored into the Allied player's starting score. These sites repair normally.

Mandatory Targeting

Mandatory Targeting reflects the political realities faced by the Allied commanders during the air war. During play of all full and Overlord campaigns, certain commands may be forced to attack certain target types. A message is displayed to show the Allied player this at the beginning of his Planning Phase. The mandatory targets are:

U-Boat Pens
V-Weapon Sites
Avalanche Targets (see p. 110)
Overlord Targets (see p. 109)

Pre-emptive Strikes: To prevent the game from forcing certain mandatory targeting restrictions against your commands, you may make pre-emptive strikes against the following targets:

- By destroying U-boat Factories (and bringing their total capacity down under 1,000), you won't be forced to target U-Boat pens.
- By destroying V-Weapon Factories (and bringing their capacity down under 200), you won't be forced to target V-Weapon Sites.

Winning The Game

During play, if you are in doubt as to which commands are under mandatory targeting restrictions, open the "Set Bomber Targets" tab and select a command. If that command is under the restriction, it will be marked in red. Commands under mandatory targeting cannot be ordered to attack non-mandatory targets as "primary targets." However, you can attack any and all target types as "secondary" targets. See p. 70 for details about primary and secondary targets.

Axis Ground Troops

To simulate some of the ground war taking place during World War II, ***Bombing the Reich*** includes Axis ground troops (or ground units). Only Axis ground units are present in the game; Allied units are represented abstractly by removing targets and switching ownership of airfields as the Allied troops roll forward.

The only scenarios in BTR that have ground troops are Avalanche, Overlords I & II, and the full-length Campaigns of 43 and 44. In all of these campaigns, the targeting and (possible) destruction of these ground troops is important. As the Axis player, you cannot move these units. They are static for the most part, but will move *on their own* depending upon various conditions during play. For example, during the Avalanche campaign, all ground troops will begin to pull back to the Gustav line sooner or later, and then try to hold that position until the end of play (if they get there, they are very difficult to take out). The more disruption the Allied player can deliver to ground troops, the easier it will be for Allied troops to cause a breakthrough (a breakthrough occurs when a permanent defensive line has been breached - i.e., the Gustav Line, the Gothic Line, the Normandy Front, and the West Wall). The sooner the Allied breakthrough occurs, the better chance the Allied player has to score points necessary to win the campaign. But all is not as easy as it seems, for ground troops collect reinforcements as play goes on (through a line of railyards), which helps them to maintain their combat effectiveness and hold their defensive lines.

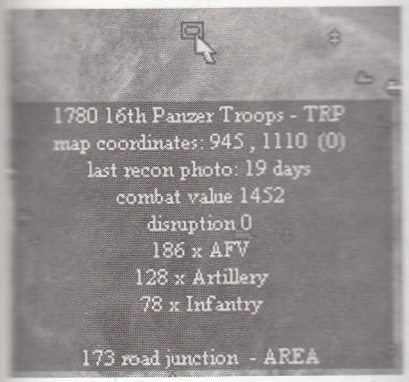
There are several different ground troop

(1) Infantry (divided between regul
static infantry [an empty box], and para
symbol]. There are no real differences
difference is reflected in their Combat V

(2) Panzergrenadier [a box with a
These units represent lighter armored u

(3) Armor [a box with an oval
stronger and more fully armed units.

Troop Combat Value



fighting vehicles (AFVs). Ground units
strength, so low-level bombing of them

Damage to ground units is handled
to other targets. As it takes damage, a
gray to orange to red. This damage re
During play, this disruption is aleviated
which are piped into the unit through
Attacking a unit's supply line (which is
select the unit), can delay reinforceme
targets, but will rarely ever permanentl

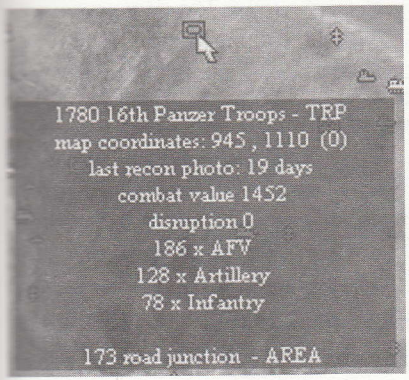
There are several different ground troop types in ***Bombing the Reich***:

(1) Infantry (divided between *regular infantry* [a box with a full X], *static infantry* [an empty box], and *parachute troops* [a box with paradrop symbol]. There are no real differences between these infantry types; the difference is reflected in their Combat Values (see below).

(2) Panzergrenadier [a box with an X and an oval armor symbol]. These units represent lighter armored units, half-tracks, etc.

(3) Armor [a box with an oval armor symbol]. These represent stronger and more fully armed units.

Troop Combat Value



Each ground unit has a Combat Value. This represents how strong it is. As the unit takes damage, this number goes down and its disruption number goes up. Units with really high disruption values are weaker and therefore cannot fight as well, and thus are less likely to keep Allied troops from causing a breakthrough. All ground units are comprised of a certain number of infantry, artillery, and armored fighting vehicles (AFVs). Ground units also have their own intrinsic AA strength, so low-level bombing of them is difficult at best.

Damage to ground units is handled basically the same way as damage to other targets. As it takes damage, a ground unit changes color from gray to orange to red. This damage represents a unit's disruption level. During play, this disruption is aleviated by reinforcements and resupply, which are piped into the unit through connected supply-line railyards. Attacking a unit's supply line (which is reflected by a white line when you select the unit), can delay reinforcements and supply from reaching the targets, but will rarely ever permanently cripple the unit.

Winning The Game

How Allied Invasion and Ground Combat Works

The ground war in ***Bombing the Reich*** is handled behind the scenes. The player does not specifically control any ground units, move them, attack with them, etc. The goal of the Allied player, through his coordination of the air war, is to try to deliver as much disruption/damage to ground units as he can. The more disruption/damage he delivers, the better his invasion forces will fight and the better the breakthrough.

At the end of each turn after an Allied invasion has occurred (a message will appear telling you when the invasion begins), the game determines the current state of the ground war by rolling dice. The game makes a separate roll for each Axis unit on the map. The game compares the combat value of the Axis unit against the roll, and if the Axis player wins, a breakthrough is delayed by one day. If the Axis player fails the roll, then the breakthrough is accelerated by one day.

There are four Allied invasion stages:

First Invasion Stage: Right after the allies come ashore, Axis units start moving toward their initial defensive line (the Gustav Line in Italy or the Normandy Line in France)

Second Invasion Stage: This is the Allies attempt at breaking through the initial defensive line.

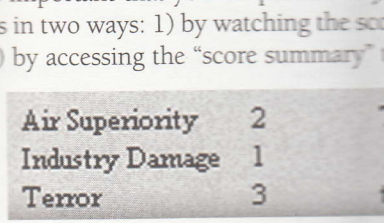
Third Invasion Stage (delaying phase): After the breakthough of the initial defensive line, Axis forces withdraw to their secondary defensive line (West Wall in Germany or the Gothic Line in Northern Italy). During this stage, there are dice roll chances that the Axis troops may delay the advance.

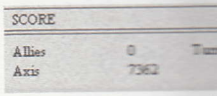
Fourth Invasion Stage: This is the Allies attempt at breaking through the secondary defensive line.

Fifth Invasion Stage: This is the period following the Allied breakthrough of the secondary defensive line. If Allied troops break the West Wall, they advance towards Berlin and (ultimately) win the scenario. If Allied troops break the Gothic Line, they advance towards Northern Italy.

Assessing Your Score

It's important that you keep track of y
do this in two ways: 1) by watching the sc
and 2) by accessing the "score summary"





Game Score: For simplicity's sake, the
turn tab at all times. If you are playing a
score is a total for both sides. If you a
Campaign, the score is divided out amon
Superiority, Industry Damage, and Terro
numbers here will change if a score ch
Support Campaigns, the score may chan
each turn. In the Strategic Bombing Cam
may change often, though it is expected
between individual turns. This is due to t
It takes a long time to deliver enough d
score begins to move. As a result, we've ad
below) which gives you more informatio
battle is going.

Turn/End: This section of the tab sho
total turns (or days) in the campaign. W
game ends.

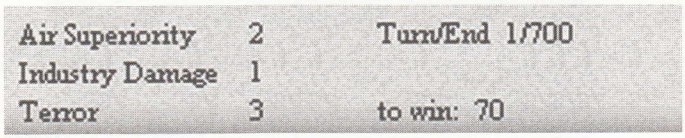
To Win: This section of the tab show
need to win the campaign. This only
Campaigns. Attacker and Defender Loss
tally of destroyed aircraft for both sides.

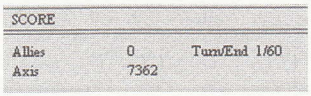


Score Summary Tab: You ma
during play. It provides a more
and how it was derived.

Assessing Your Score

It's important that you keep track of your score during play. You can do this in two ways: 1) by watching the score numbers on the bottom tab, and 2) by accessing the "score summary" tab.





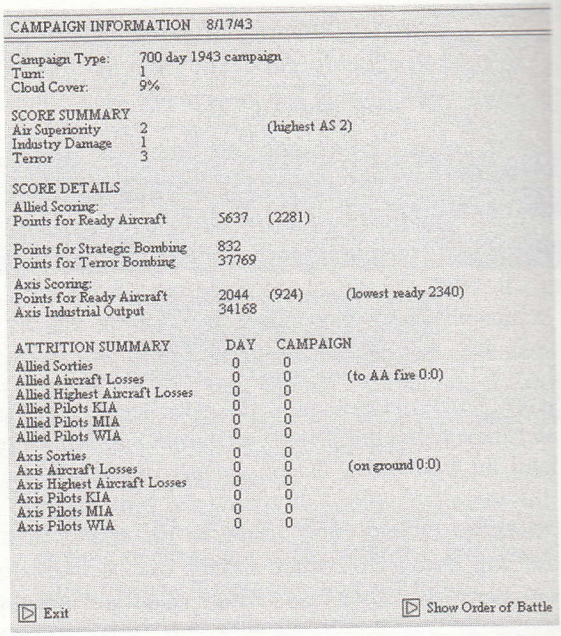
Game Score: For simplicity's sake, the game score is kept on the bottom tab at all times. If you are playing a Ground Support Campaign, the score is a total for both sides. If you are playing a Strategic Bombing Campaign, the score is divided out among the three damage levels: Air Superiority, Industry Damage, and Terror. At the end of each turn, the numbers here will change if a score change has occurred. In Ground Support Campaigns, the score may change often and usually between each turn. In the Strategic Bombing Campaigns, the three damage levels may change often, though it is expected that you'll notice little change between individual turns. This is due to the nature of strategic bombing. It takes a long time to deliver enough damage to the enemy before the score begins to move. As a result, we've added a "score summary" tab (see below) which gives you more information about how the course of the battle is going.

Turn/End: This section of the tab shows you the current turn and the total turns (or days) in the campaign. When you reach the last turn, the game ends.

To Win: This section of the tab shows you the number of points you need to win the campaign. This only appears in Strategic Bombing Campaigns. Attacker and Defender Losses: This is an up-to-the-minute tally of destroyed aircraft for both sides.



Score Summary Tab: You may review the score summary tab during play. It provides a more detailed overview of your score and how it was derived.


CAMPAIGN INFORMATION 8/17/43

Campaign Type: 700 day 1943 campaign
Turn: 1
Cloud Cover: 9%

SCORE SUMMARY
Air Superiority 2 (highest AS 2)
Industry Damage 1
Terror 3

SCORE DETAILS
Allied Scoring:
Points for Ready Aircraft 5637 (2281)

Points for Strategic Bombing 832
Points for Terror Bombing 37769

Axis Scoring:
Points for Ready Aircraft 2044 (924) (lowest ready 2340)
Axis Industrial Output 34168

ATTRITION SUMMARY	DAY	CAMPAIGN	
Allied Sorties	0	0	
Allied Aircraft Losses	0	0	(to AA fire 0:0)
Allied Highest Aircraft Losses	0	0	
Allied Pilots KIA	0	0	
Allied Pilots MIA	0	0	
Allied Pilots WIA	0	0	
Axis Sorties	0	0	
Axis Aircraft Losses	0	0	(on ground 0:0)
Axis Highest Aircraft Losses	0	0	
Axis Pilots KIA	0	0	
Axis Pilots MIA	0	0	
Axis Pilots WIA	0	0	

Exit Show Order of Battle

The top section of the tab shows the date, the campaign being played, the turn you're on, and the current cloud cover. The "Score Summary" section shows the score broken down by damage level (if necessary). The "Score Details" section divides both German and British scoring into separate categories, as described below: Points for Ready Aircraft: This is the number of aircraft ready for service for the Allies.

The number in parentheses (_) is the number of aircraft currently out of service.

Points for Strategic Bombing: The Allied player scores points for damaging Axis industry. This is the current point total. Points for Terror Bombing: The Allied player scores points for urban bombing. This is the current point total.

Points for Ready Aircraft: This is the number o
the Axis. The number in parenth
craft currently out of service.

Axis Industrial Output: This is the current Axis
the Reich's industrial might is attac

Damaging/Destroying Aircraft on the Grou
shows two numbers divided by a
is the number of Axis aircraft des
ond number is the number of
ground. Keep in mind that even w
almost always be more damaged

To AA Fire: The "To AA Fire" display shows tw
(0:0). The first number is the num
by AA; the second number is the
aged by AA.

Order of Battle Display: At the bottom
of Battle" to open your side's list of units
select a specific command to highlight all air
that command. You may also select indivi
where they are currently located, and then
column indicates the number of ready (ser
the "U" column indicates the number of un
craft in the unit. Units with an asterisk (*)
with nighttime navigation equipment. The
cific to the campaign you are playing. Du
information listed here is in a state of flux,
all the time. It's recommended that you revi
the Movement, Briefing, or Raid Planning

NOTE: The information under "Score Det
Reaction Phase whenever you click on the S
update itself once the current Reaction Phase

Points for Ready Aircraft: This is the number of aircraft ready for service for the Axis. The number in parentheses (_) is the number of aircraft currently out of service.

Axis Industrial Output: This is the current Axis industrial output strength. As the Reich's industrial might is attacked, this number goes down.

Damaging/Destroying Aircraft on the Ground: The "on ground" display shows two numbers divided by a colon (0:0). The first number is the number of Axis aircraft destroyed on the ground; the second number is the number of Axis aircraft damaged on the ground. Keep in mind that even with this adjustment, there will almost always be more damaged aircraft than destroyed aircraft.

To AA Fire: The "To AA Fire" display shows two numbers divided by a colon (0:0). The first number is the number of Allied aircraft destroyed by AA; the second number is the number of Allied aircraft damaged by AA.

Order of Battle Display: At the bottom of the tab, select "Show Order of Battle" to open your side's list of units by command. You may then select a specific command to highlight all airfields on the map attached to that command. You may also select individual units in the list to see where they are currently located, and then review further details. The "R" column indicates the number of ready (serviceable) aircraft in the unit; the "U" column indicates the number of unavailable (out-of-service) aircraft in the unit. Units with an asterisk (*) beside their names are units with nighttime navigation equipment. The commands listed here are specific to the campaign you are playing. During the Reaction Phase, the information listed here is in a state of flux, because data is being updated all the time. It's recommended that you review the Order of Battle during the Movement, Briefing, or Raid Planning Phases.

NOTE: The information under "Score Details" will update itself during the Reaction Phase whenever you click on the Summary tab. And, it will fully update itself once the current Reaction Phase is complete.

Winning The Game

The "Attrition Summary" section is a running total of various data which are important for you to review to see how quickly your air force is being whittled down. It shows totals for both the current turn and the campaign. It shows the number of sorties (i.e., the total number of aircraft launches), the number of aircraft lost, and highest aircraft loss type, and KIA, MIA, and WIA pilot totals. This information does update during the current Reaction Phase, unlike the information under "Score Details." It's important to note that the "Highest Aircraft Loss" totals represent the highest losses for the indicated aircraft type, and also the total losses of that type for the campaign. For example, if you lost 13 B-17s during the current turn, the number 13 appears for the day and the total number of B-17s lost for the campaign will be listed under the campaign heading. Also, if a Reaction Phase comes and goes without any Allied sorties (and that's very likely in long campaigns), the highest aircraft losses remain the same as the last turn in which German sorties ran. **NOTE**: The score summary information tab is very useful but it is summary data. If you want more detailed information about the status of specific air units, location damage, top pilot lists, etc., refer to the specific database where that information can be found.

When is Victory Assessed? Victory is assessed at the very end of each Reaction Phase, right before the next Axis Movement or Allied Intelligence Briefing Phase. If victory is achieved, the game ends.



Men of the 491st.

VII. Target Descriptio

Area (AREA): Areas represent populati



etc.). Bombing area targets Axis terror, which goes to campaigns.

Radar Site (RADAR): Radar sites are



Knocking out radar sites re spot and attack your raids flying at 500 feet or higher also be jammed by electro into play more frequently (see p. 92).

Airfields (AF): Primary airfields are th



Axis units operate. Dest utmost importance, as doi aircraft flying out of those f the far zoom-out mode) a airfields you should try to are colored white. Captur combat) are colored grey captured, you may move y using it normally. Air units fields with over 50% d information).

Aluminum Factory (ALUM): Aluminu



ical industries" (see p. 90) production of replacemen them reduces the effectiven

Oil Storage (OILS): Oil storage facili



reserves of Europe. The A of the reasons the Axis trie move on into the Middle facilities (along with attack ical factories) begins to cre reduces the amount of sor

is a running total of various data which
how quickly your air force is being whit-
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n sorties ran. **NOTE**: The score summa-
it is summary data. If you want more
f specific air units, location damage, top
atabase where that information can be

y is assessed at the very end of each
t Axis Movement or Allied Intelligence
he game ends.



e 491st.

VII. Target Descriptions

Area (AREA): Areas represent population centers (i.e., towns, suburbs, etc.). Bombing area targets (or "terror" bombing) increases Axis terror, which goes toward achieving victory in many campaigns.



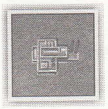
Radar Site (RADAR): Radar sites are Germany's first line of defense. Knocking out radar sites reduces Germany's effectiveness to spot and attack your raids. German radar can detect raids flying at 500 feet or higher. In addition, German radar can also be jammed by electronic warfare aircraft. This comes into play more frequently during the Nachtjagd scenarios (see p. 92).



Airfields (AF): Primary airfields are the main airfields from which all Axis units operate. Destroying primary airfields are of utmost importance, as doing so curtails the performance of aircraft flying out of those fields. Axis controlled airfields (in the far zoom-out mode) are colored yellow. These are the airfields you should try to destroy. Allied controlled airfields are colored white. Captured Axis airfields (during ground combat) are colored grey. Once an Axis airfield has been captured, you may move your units into that field and begin using it normally. Air units cannot launch from primary airfields with over 50% damage (see p. 112 for more information).



Aluminum Factory (ALUM): Aluminum factories are classified as "critical industries" (see p. 90). Aluminum factories help in the production of replacement aircraft, so serious damage to them reduces the effectiveness of aircraft factories.

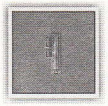


Oil Storage (OILS): Oil storage facilities house most of the crude oil reserves of Europe. The Axis' oil supplies are limited, (one of the reasons the Axis tried so hard to take North Africa and move on into the Middle East), so destroying oil storage facilities (along with attacks against oil refineries and chemical factories) begins to create a fuel shortage, which in turn reduces the amount of sorties the Axis can conduct.



Target Descriptions

Oil Refinery (OILR): Oil refineries convert crude oil into fuel for Axis aircraft. Destroying oil refineries (along with attacks against oil storage facilities and chemical factories) begins to create a fuel shortage, which in turn reduces the amount of sorties the Axis can conduct. The famous Ploesti raids are an example of such attacks.



Chemical Factory (CHEM): Chemical factories are classified as "critical industries" (see p. 90). Destroying chemical factories (along with attacks against oil storage facilities and oil refineries) begins to create a fuel shortage, which in turn reduces the amount of sorties the Axis play can conduct. Damage to chemical factories also reduces the effectiveness of rubber factories.



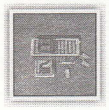
Synthetic Fuel Refineries (FUEL): Synthetic fuel refineries are large chemical plants used to convert coal into gasoline substitutes. All Axis aviation fuel comes from these refineries. Attacking these facilities scores you industrial damage points and also reduces the fuel available to fly aircraft and resupply ground troops. Synthetic fuel refineries are dependent upon oil storage facilities and chemical factories, so attacking those facilities along with systematic attacks against synthetic fuel is good policy.



Ball Bearings Factory (BBFAC): Ball bearing factories are classified as "critical industries" (see p. 90). Damage to ball bearings factories reduces the effectiveness of aircraft and armaments factories, thus hindering the production of replacement aircraft.



Electric Power Plant (POWER): Electric power plants are classified as "critical industries" (see p. 90). All factories/facilities need electric, so heavy damage to electric power plants reduces the effectiveness of all other industries in the game.



Steel Factory (STEEL): Steel factories tries" (see p. 90). Damage ments factory production repairs and replacements.



Rubber Factory (RUBBER): Rubber industries" (see p. 90). Da armaments factory produ craft repairs and replacem



Aircraft Factory (AFAC): Aircraft facto replacement aircraft, thus ability to replace aircraft.



Engine Factory (EFAC): Engine facto destroying them hinders t



Avionics Factory (CFAC): Avionics fa craft, thus destroying them and replace aircraft.



Armaments Factory (ARM): Armam weapons of war. Damage Axis' aircraft and ground



Railyard (RAIL): Railyards are the hu Europe and also act as the They also act as the prim thus damaging them ca ability to transport his etc.) and ground defense



Steel Factory (STEEL): Steel factories are classified as "critical industries" (see p. 90). Damage to steel factories reduces armaments factory production, which in turn hinders aircraft repairs and replacements.



Rubber Factory (RUBBER): Rubber factories are classified as "critical industries" (see p. 90). Damage to rubber factories reduces armaments factory production, which in turn hinders aircraft repairs and replacements.



Aircraft Factory (AFAC): Aircraft factories are the assembly facilities for replacement aircraft, thus destroying them hinders the Axis' ability to replace aircraft.



Engine Factory (EFAC): Engine factories make aircraft engines, thus destroying them hinders the Axis' ability to replace aircraft.



Avionics Factory (CFAC): Avionics factories manufacture parts for aircraft, thus destroying them hinders the Axis' ability to repair and replace aircraft.



Armaments Factory (ARM): Armaments factories manufacture the weapons of war. Damage to armaments factories hinders the Axis' aircraft and ground defense production.



Railyard (RAIL): Railyards are the hubs of the transportation system of Europe and also act as the supply lines for all ground troops. They also act as the primary communications network, and thus damaging them can greatly reduce the Axis player's ability to transport his resources (i.e., fuel, aircraft parts, etc.) and ground defenses.



Target Descriptions

Bombing a railyard also directly affects the performance of those industries near it. For example, if you are bombing a railyard close to a chemical factory and an armaments factory, the chemical and armaments factory's performance goes down.

Ports (PORT): Ports contribute to the industrial strength of the Reich. Thus, destroying ports can help cripple the Axis' industrial power.



Command Headquarters (HQ): Axis fighter and bomber commands appear on the map for the Axis player only. They appear so that the Axis player can know where his command centers are. They are not, however, viable targets which can be attacked by Allied raids. The Allied player should not bother trying to target these during his Raid Planning Phase. Occasionally, you will receive reports that a HQ has been bombed. This occurs sometimes when and HQ is hit as a "target of opportunity".



U-Boat Factories (UFAC): U-Boat factories are the assembly plants for U-boats. Though not considered a critical industry, U-Boat factories may occasionally be classified as "political" targets and thus you may be forced to attack them under the mandatory targeting rules (see p. 97). But by taking the initiative and attacking these factories on your own, you may avoid being forced to bomb U-Boat pens, which are very often classified as "political" targets. Like other industrial targets, however, you do receive industrial damage points for attacking U-Boat factories. U-Boat factories are dependent upon armament, steel, and rubber factories.



U-Boat Pens (UPEN): U-Boat pens are the protected ports where U-Boats are refueled and repaired before returning to water. Though not considered a critical industry, U-Boat pens are often classified as "political" targets and you may be forced to attack them under the mandatory targeting rules (see p. 97). You receive no victory points for attacking U-boat pens, so it is in your interest to either avoid them, or attack U-Boat factories to reduce political pressures for mandatory targeting.



V-Weapon Factories (VFAC



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V-Weapon Sites (VSITE):



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Ground Troops (TRP): Groun



types (regular, de
types (light and h
are present, and th
will attempt to pu
You may attack g
damage you give
player to prevent s
p. 98 more inform

Overlord (OVER): Overlord is



ed in Belgium an
airfields, ports, tr
During play of tho
available, you may
plot a variety of m
Weapon sites, and
sified as "political"
attack them under

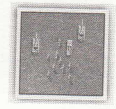
V-Weapon Factories (VFAC): V-Weapon factories are the assembly plants for V-weapons. Though not considered a critical industry, V-Weapon factories may occasionally be classified as "political" targets and thus you may be forced to attack them under the mandatory targeting rules (see p. 97). But by taking the initiative and attacking these factories on your own, you may avoid being forced to bomb V-Weapon sites, which are often classified as "political" targets. Like other industrial targets, however, you do receive industrial damage points for attacking them. V-Weapon factories are dependent upon armament, steel, and rubber factories.



V-Weapon Sites (VSITE): V-Weapon Sites are a serious threat to England. They are often classified as "political" targets and you may be forced to attack then under the mandatory targeting rules (see p. 97). You receive no victory points for attacking V-Weapon sites, so it is in your interest to either avoid them, or attack V-Weapon factories to reduce political pressures for mandatory targeting.



Ground Troops (TRP): Ground troops are represented by three infantry types (regular, defensive, and paratroop) and two armor types (light and heavy). In many campaigns, ground troops are present, and they represent the forces on the ground that will attempt to prevent Allied invasion and breakthrough. You may attack ground troops during play, and the more damage you give them, the more difficult it is for the Axis player to prevent successful invasion and breakthrough. See p. 98 more information about ground troops.



Overlord (OVER): Overlord is a collection of different target types located in Belgium and France. Overlord targets are railyards, airfields, ports, troops, radar stations, and V-Weapon sites. During play of those campaigns where Overlord targets are available, you may select this target type and your staff will plot a variety of missions against airfields, ports, troops, V-Weapon sites, and/or radar. Overlord targets are often classified as "political" targets, and thus you may be required to attack them under the mandatory targeting rules (see p.97).



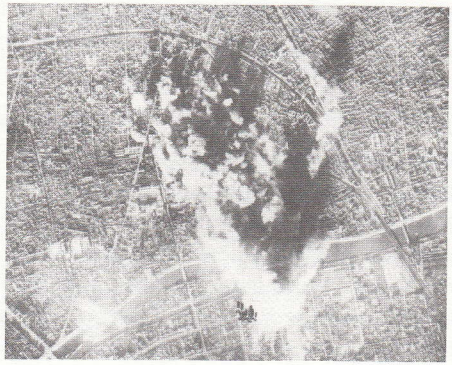
Target Descriptions

Avalanche (AVAL): Avalanche is a collection of different target types located in Italy and its surrounding areas. Avalanche targets are railyards, airfields, ports, troops, and radar sites. During play of those campaigns where Avalanche targets are available, you may select this target type and your staff will plot a variety of missions against railyards, airfields, ports, troops, and/or radar. Avalanche targets are also often classified as "political" targets, and thus you may be required to attack them under the mandatory targeting rules (see p. 97).



Target Damage Repair Rates

Target Damage: During the course of play, targets suffer damage due to Allied bombing. Potential target damage occurs when a bomber formation reaches its target and drops its bombs. The severity of the damage depends upon the number of bombers involved, flight altitude, recon photos status, etc. All non-airfield targets can take up to 100% damage. Airfields, however, because they have separate damage categories, could potentially receive 200% damage, because both the runway and the service area can suffer up to 100%. So, as you are watching your messages on the screen and the number "150" is flashed for damage to an Axis airfield, that could mean that the runway has suffered 75% damage, and the service center has suffered 75% damage.



Strategic Repair Rates: Target
are two repair ra
repair. All targets,
strategic repair ra
of points betwee

Average Repair Point
0.5
1.0
1.5
1.0
1.0
1.5
1.0
1.0
1.0
1.5
1.5
1.5
1.5
1.0
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or damage to an Axis airfield, that
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ered 75% damage.



Strategic Repair Rates: Target damage is repaired at various rates. There are two repair rate categories: strategic repair and tactical repair. All targets, except airfields and radar sites, fall under strategic repair rates. Each target repairs an average number of points between Reaction Phases, as per the chart below.

Average Repair Points Per Day	Target
0.5	Urban
1.0	Aluminum Factory
1.5	Oil Storage
1.0	Oil Refinery
1.0	Chemical Factory
1.5	Ball Bearings Factory
1.0	Electric Power Plant
1.0	Steel Factory
1.0	Rubber Factory
1.5	Aircraft Factory
1.5	Engine Factory
1.5	Avionics Factory
1.5	Armaments Factory
1.0	Railyard
1.0	Port
3.0	V-Weapon Sites
1.5	V-Weapon Factories
1.0	U-Boat Pens
1.5	U-Boat Factories
1.0	Synthetic Fuel

Target Descriptions

One Week Campaigns and Industrial Repair: Regardless of the repairs rates mentioned above, no industrial targets repair damage during one-week campaigns.

Tactical Repair Rates: Airfields are repaired very quickly and, therefore, fall under tactical repair rates. In addition to airfields, radar sites also have a communications section, and it, too, is repaired quickly. Below is a list of tactical repair rates.

NOTE: An airfield with over 50% runway damage cannot launch aircraft.

Target Section	Points
Communications	1 per 3 hours (airfields and radar sites)
Airfield Service	1 per 6 hours
Radar Site	1 per 3 hours
Runway (over 50%)	1 per minute
Runway (50% less)	1 per 2 minutes

However, as you can see by the repair rates above, this will hardly be a problem in most cases. Runway damage to airfields usually translates into launch delays, which can change quickly during play.

Hostile Weather and Critical Industry Damage: Neither hostile weather nor damage suffered to targets due to critical industry adjustments affect repair rates in any way.

VII. HOT KEYS

Below is a list of hot keys in Bombing as you play to refresh your memory. over a particular button, and if ther function, it will appear in the messa to the game options menu (CTRL-O these hot keys well, especially if you made (see p. 49).

General

Q: .....
CTRL-S: .....
Z: .....
X: .....

Axis Move Phase

G: .....
A: .....
D: .....
R: .....
T: .....
P: .....
U: .....
L: .....
N: .....
E, ESC: .....

Axis Reaction Phase

S: .....
C: .....
P: .....
M: .....
R: .....
D: .....
I: .....
CTRL-R: .....
CTRL-M: .....
CTRL-O: .....
CTRL-T: .....
COMMA (,) .....

F1 .....

l Industrial Repair: Regardless of the
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	.1 per 6 hours
	.1 per 3 hours
	.1 per minute
	.1 per 2 minutes

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uickly during play.

l Industry Damage: Neither hostile
argets due to critical industry adjust-

VII. HOT KEYS

Below is a list of hot keys in ***Bombing the Reich***. You may refer to this list as you play to refresh your memory, or you may hover the mouse arrow over a particular button, and if there is a hot key associated with that function, it will appear in the message box in parentheses (example: "go to the game options menu (CTRL-O)"). It's recommended that you learn these hot keys well, especially if you are playing the game in full-screen mode (see p. 49).

General

Q: . . . . . .Quit Game
CTRL-S: . . . . . .Save Game
Z: . . . . . .Zoom in the map
X: . . . . . .Zoom out the map

Axis Move Phase

G: . . . . . .Move AA Guns
A: . . . . . .Move Air Units
D: . . . . . .Set Doctrine
R: . . . . . .Action Report
T: . . . . . .List Targets
P: . . . . . .Top Pilots
U: . . . . . .List Air Units
L: . . . . . .Aircraft Losses
N: . . . . . .Aircraft Replacements
E, ESC: . . . . . .End Phase

Axis Reaction Phase

S: . . . . . .Start/Stop
C: . . . . . .Continue
P: . . . . . .Set Patrol
M: . . . . . .Move Patrol
R: . . . . . .Recall Unit
D: . . . . . .Set Doctrine
I: . . . . . .Intercept Raids
CTRL-R: . . . . . .List Raids
CTRL-M: . . . . . .Message Level
CTRL-O: . . . . . .Game Options
CTRL-T: . . . . . .Game Speed
COMMA (,) . . . . . .Expand/Minimize Minimap (Full Screen Only)
F1 . . . . . .Recall all units

Hot Keys

Allied Raid Planning Phase

S: . . . . . .Set Bomber Targets
B: . . . . . .Bombing Missions
N: . . . . . .Night Bombing
R: . . . . . .Recon
I: . . . . . .Night Intruder
F: . . . . . .Fighter Sweep
CTRL-P: . . . . . .Show all Paths
CTRL-R: . . . . . .Review Missions
A: . . . . . .Move Air
U: . . . . . .List Units
T: . . . . . .List Targets
E. ESC: . . . . . .End Phase

Allied Reaction Phase

S: . . . . . .Start/Stop
C: . . . . . .Continue
CTRL-R: . . . . . .Review Missions
CTRL-M: . . . . . .Message Level
CTRL-O: . . . . . .Game Options
CTRL-T: . . . . . .Game Speed
E, ESC: . . . . . .End Phase
COMMA (,) . . . . . .Expand/Mininmize Minimap (Full Screen Only)
F2 . . . . . .Toggle on/off all non-targeted locations

Allied Intelligence Briefing Phase

R: . . . . . .Action Reports
T: . . . . . .List Targets
P: . . . . . .Top Pilots
U: . . . . . .List Air Units
L: . . . . . .Aircraft Losses
N: . . . . . .Aircraft Replacements
E, ESC: . . . . . .End Phase

IX. Historical Over



THE DOOR IS OPEN

"All such tomfoolery will be unnece to the West. For me the question of and as soon as possible, the Russi Hermann Goering's response to Ad Defense of Germany in 1942.

On September 17th, 1940 Ad Britain and began turning his for Pandora's box. Goering's Luftwaffe necessary for a cross-channel invas was postponed indefinitely. The R summer of 1941.

The Battle of Britain raged on, new fighter-bomber attacks (calle were pulled from the West for re invasion of Russia. That vast horiz By 1941 only two fighter groups re West Front: the veteran JG 26 co JG 2. Alone, this stalwart pair sto England.

.....Set Bomber Targets
.....Bombing Missions
.....Night Bombing
.....Recon
.....Night Intruder
.....Fighter Sweep
.....Show all Paths
.....Review Missions
.....Move Air
.....List Units
.....List Targets
.....End Phase

.....Start/Stop
.....Continue
.....Review Missions
.....Message Level
.....Game Options
.....Game Speed
.....End Phase
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.....Action Reports
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.....Top Pilots
.....List Air Units
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...Aircraft Replacements
.....End Phase

IX. Historical Overview



Reichsmarshal Hermann Goering, Commander of the German Luftwaffe.

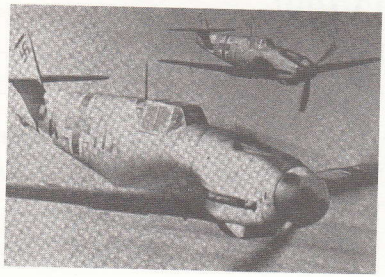
THE DOOR IS OPEN

"All such tomfoolery will be unnecessary once I get my Geschwader back to the West. For me the question of defense will then be settled. But first, and as soon as possible, the Russians must be brought to their knees." Hermann Goering's response to Adolf Galland's plea for a concerted Air Defense of Germany in 1942.

On September 17th, 1940 Adolf Hitler officially closed the door to Britain and began turning his forces toward the east. It would open a Pandora's box. Goering's Luftwaffe had not achieved the air superiority necessary for a cross-channel invasion. The invasion of the island nation was postponed indefinitely. The Russian Front would be opened in the summer of 1941.

The Battle of Britain raged on, of course. Night bombing missions, new fighter-bomber attacks (called Jabo) continued. But air resources were pulled from the West for rest and refitting in preparation for the invasion of Russia. That vast horizon would swallow the Luftwaffe whole. By 1941 only two fighter groups remained in France for the defense of the West Front: the veteran JG 26 commanded by Adolf Galland along with JG 2. Alone, this stalwart pair stood against 75 day-fighter squadrons in England.

Historical Overview



A pair of ME-109Fs on patrol. The 109 was the principal fighter aircraft of the Luftwaffe throughout the war. Over 30,000 were produced.

The Luftwaffe (LW) did not see any real reason for a defensive air campaign. After all, Germany was a nation surrounded by land and her land armies were stout. Air power was a tactical weapon wickedly joined to the Wehrmacht. Where the Germany Army went on the offensive, there the LW preceded it. Many times over the Luftwaffe used the element of surprise to wipe out an enemy air force on the ground. Then LW air superiority fighters—the ME-109 and later the FW-190—fought to establish air superiority over the battlefield. Finally, its famous dive-bombers and medium bombers softened up ground troops, artillery positions, and lines of communication that directly affected the ground battle. As the army advanced, enemy air bases were captured and Jagdgeschwaders (fighter groups) quickly moved up to support the ground attack. This sequence of events was pushed upon Poland, the Lowlands and France. It was attempted in Britain. It would succeed again in Russia. And tragically would be attempted during the Battle of the Bulge, Germany's 1944 winter offensive in the Ardennes.

To be sure, the great distances involved across the European Theater of Operations partially dictated this philosophy of air war. In 1939, after a tour of the anti-aircraft emplacements in Hamburg, LW commander Hermann Goering boasted to its citizens in attendance: "My name is not Goering if any enemy aircraft is ever seen over Germany. You can call me Meyer." He would later come to regret that comment. Still, it was inconceivable that Germany itself could be bombed.



A pair of ME-109Fs on patrol. The 109 was the principal fighter aircraft of the Luftwaffe throughout the war. Over 30,000 were produced.

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The distances were enormous given the aircraft of the time. A flight in the Battle of Britain might last only one or two hours. But the battles over Germany would put the aggressors in their bombers and fighter escorts in nearly the entire day. Not only would Allied aircrews be exposed to the elements and the demands of sitting for so long, but to continuous attack going in and coming home again.



The B-17 came to symbolize the American daylight bombing effort. It was stable in flight and resilient in combat. Bristling with guns at every quarter, it was at first thought unassailable. The B-17G shown here with the added chin turret hosted 13 .50 Cal machine guns. (National Air and Space Museum)

The Allies had an entirely different philosophy of air power. Great Britain and the United States did not tie their air power to their ground forces but held them toward the rear for strategic goals. The idea that a nation could be brought to the peace table solely through the use of air power was appealing to nations surrounded by water and far removed from any real land invasion. From a distance, they could strike and rain terror on their foes. Hence the Allies invested enormous resources in four engine bombers, and later, their escort. Even when the great bombers were used for tactical purposes, such as in the D-Day invasion, it was done after intense argument and never lasted more than a day.

Still, the 9th Air Force would be called the tactical airforce. Patton used it to hold his right flank in 1944 during his swift advance across central France. But even this air force still committed a great deal of its resources to objectives far from the battlefront. There was no equivalent to the German's Stuka dive-bomber in the American Air Force, or in Britain's Bomber Command. Instead fighter planes, such as the rugged P-47, the P-38, the Tempest and the Typhoon, were pressed into this service later in the ground war. In fact, the Air Force didn't bother to write a manual on air to ground coordination until 1943! The Germans wrote theirs in 1936.

Historical Overview

The 8th Airforce and Bomber Command in England and the 15th Airforce in North Africa focused their efforts on a long range, strategic bombing campaign. British Bombers flew by night and committed themselves to area bombing. American bombers flew by day and committed themselves to precision, high altitude bombing. This coordination of forces came to be known as the "round the clock" bombing of Germany.

The Allies' philosophy of long-range, strategic bombing was codified in January 1943, during an important meeting between President Roosevelt and Winston Churchill and their respective military leaders in Casablanca. There they made the objective of the Allied Air Force in Europe clear; "Your primary objective will be the progressive destruction and dislocation of the German military, industrial and economic system, and the undermining of the morale of the German people to a point where their capacity for armed resistance is fatally weakened." The top priorities for bomber attack were: 1) German submarine construction yards; 2) The German aircraft industry; 3) Transportation; 4) Oil plants; 5) Other targets in the enemy war industry.

OPENING SALVOS IN THE WEST



The FW-190 was a respected fighter aircraft. It could house four 20mm cannon plus machine-guns and yet was extremely nimble and hardy. It was a fighter that put the Germans far ahead of their adversaries in 1941.

"We won't do much talking until we've done more fighting. After we've gone, we hope you'll be glad we came." General Eaker, commander 8th AF, in his arrival speech to a British audience in 1942.

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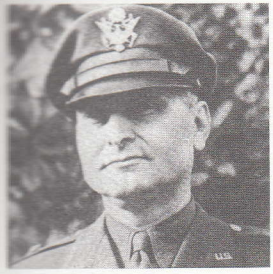
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Chapter Nine

With Hitler's attention turned to the East, the Allies had an opening in the West. But the first attempts to exploit it were anemic at best. In January of 1941 the RAF began its first of many "Circuses," "Rodeos" and "Ramrods." These were heavily escorted bomber raids, large and small Ramrod style fighter sweeps. They were all an attempt to draw the Luftwaffe up to do battle over France.

For the most part the Luftwaffe simply ignored the "Rodeos." When the advantage was clearly theirs—with superior numbers and altitude—then they would fight. Later, into the summer of 1941, the new FW-190A was introduced into the JG26 squadrons. In the hands of these elite pilots the Luftwaffe became aggressive. Immediately the new fighter dominated the Spitfire V. Fighter Command began to step down its attacks.

Meanwhile, the Russians in the east were pleading for the Allies in the west to bring any pressure they could upon Germany. Indeed, many were afraid that the Soviet Union would collapse and then Hitler would turn his armies again to the West. If a ground offensive could not be begun then pressure must be brought to bear from the air to draw away resources from the Eastern Front.



General Ira Eaker, first commander of 8th AF Bomber Command and later the 8th AF. Like all the leaders of the United States Air force in the early 1940s, he was a bomber man through and through. He was a true believer in strategic bombing as a way to victory. (USAF)

The 8th Air Force arrived in the United Kingdom in May of 1942. It began with 39 officers and 384 enlisted men. It was only a beginning. The growth would be slow at first and miraculous by the end. Through the course of the war 350,000 airmen would serve with her. 26,000 would die with her, more than all who died in the US Marine Corps in all theaters of operation.

Historical Overview

The first bomber foray into battle with B-17s occurred on August [illegible], 1942. Twelve of the four-engine bombers, together with an RAF escort of some 400 fighters, attacked the Rouen-Sotteville area in France. Afterward, General Ira Eaker, commander of the 8th AF, estimated he would need 250-300 bombers in a raid to penetrate German air space. He would not muster such a force until late May of 1943.

The first fighter forays were not very formidable either. The 8th Air Force Fighter Command began with the 4th FG, a cadre of veteran American pilots who flew Spitfires in the Battle of Britain. They would amass the most kills of any allied fighter group in the war both on the ground and in the air. Men like Blakeslee, Gentle, and Godfrey rose through the ranks.. The American bombers directed most of their early attacks against submarine pens in France. But even this short distance, just across the English Channel, was out of range for the new P-47C fighter. There were few bomber escort missions for the fighter groups. Instead they repeated the "Rodeos" the British had tried in 1941. But once again the Germans refused to fight. In 9 months of fighting, the 8th Fighter Command could only claim 15 Luftwaffe fighters as destroyed. An action report by the 4th FG once left this wry report: "An uneventful sweep to Rouen today. With all our sweeps, France should be a tidy place soon."

It would be another year before the 8th Air Force would come into form as a force to be reckoned with by the Luftwaffe. Even then there would be more lessons to learn.



Gen. Jimmy Doolittle, was commander of the 12 AF in North Africa and later the 8th AF in England. He always tackled problems head on. He once took a tour of his bomber bases in North Africa flying a B-26. Reports had reached him of complaints that the Martin Bomber was a crew killer. So he would perform an aerobatics show on one engine over each of the airfields and then land and do his inspection.

"THE SOFT UNDERBELLY O

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The operation became a valuable tr
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Groups were waiting for the Allies.
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The P-38 made itself known to
It produced 37 veteran aces and ga
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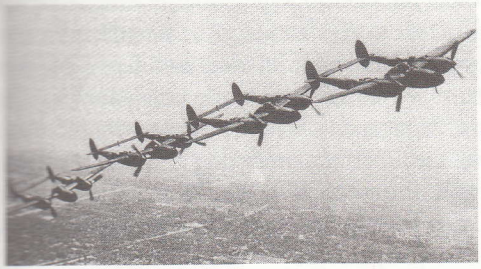
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THE SOFT UNDERBELLY OF EUROPE

Just as the "Mighty Eighth" began forming and gaining strength, valuable air resources were diverted to the invasion of North Africa, Operation Torch, in the fall of 1942. The massive build up of the 8th AF was delayed until the winter had set in and the already dismal weather began to worsen in England. General Eaker was to comment during this time that "diversions [of assets] were a greater threat to the bombing offensive than the Luftwaffe."

But in North Africa the American airforce first began to cut its teeth. The operation became a valuable training ground both for new pilots and Battle of Britain aces. There they were pitted against a German Air Force that was both superior in numbers and experience. Three German Fighter Groups were waiting for the Allies. By this time some German "experten," as German aces were called, already counted 100 or more confirmed victories. Captain Hans-Joachim Marseille of the veteran JG27 had 158 victories alone by September of that year. Most American Pilots were looking for victory number one.



The P-38F was the principal air superiority fighter in North Africa, a job it wasn't originally designed to do. It was designed as a high altitude bomber interceptor. But long range and high speed would let it rise to the task. Few Lightnings, as they were called, would be deployed in Europe, however, as demand was so great for them in the Pacific Theater of Operations where ranges were extreme. (USAF)

The P-38 made itself known to the German Airforce in North Africa. It produced 37 veteran aces and gained the respect of the Luftwaffe. Easily identified by its twin boom design, it was called the "Forked Tailed Devil." It was fast, heavily armed and could take the battle deep behind enemy lines. North Africa would be the Luftwaffe's first lesson in what a long-range fighter could do deep into its own air space. It was an omen of things to come, for later, the P-38 was the first escort fighter to appear over Berlin.

Historical Overview

It was also in Africa the valuable lessons of air superiority were learned. The bombers were like a giant magnet that drew up the Luftwaffe for battle. American fighters doing close escort found ample targets for their guns. Though close escort duties would often expose the fighters to initial attacks, they would quickly get into the fight and bring down the opposing fighters. The battles were hard fought, but eventually air superiority was won over North Africa.

The campaign in North Africa advanced quickly through May of 1943. Germany simply could not manage the extended supply lines over the Mediterranean Sea. With air superiority won the successful invasion of Sicily was assured. It was a short leap from Tunis to the island and allied air power was like a thick blanket over the invasion. The invasion was launched July 10th, and by August 17th the island was secure. Mussolini's position as the leader of Italy was threatened by the invasion. When Allied bombs began to fall upon Italian cities the people began to plot his ruin. He was arrested on July the 25th. On September 8th the Italian government signed an armistice with the Allies. The next day Operation Avalanche, the invasion of Italy itself, began.

Prior to the invasion of Italy, at Salerno, Operation Avalanche included a dedicated air campaign. Its aim was to tie up major transportation junctions, break down lines of communication, and establish air superiority over the peninsula. Italy proved an easy mark because of its long slender geographical shape. The targets were compressed and major choke points were easy to create, thus hindering the movement of German defenders. Ironically, the success of the air campaign later worked to the advantage of the German forces once the ground war began.



Tactical air support in coordination with ground forces was first learned in the desert by the American Air forces. A-20 Bombers with their fighter cover scour overhead an advance of British "honey" tanks. (U.S. Army photo)

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Tactical air support in coordination with ground forces was first learned in the desert by the American Air forces. A-20 Bombers with their fighter cover scour overhead an advance of British "honey" tanks. (U.S. Army photo)

Chapter Nine

Eventually there was a need for two American airforces in the Mediterranean Theater of Operations. The 12th AF had overseen the invasion of Africa, Sicily and Italy. It was now split into the 15th (Strategic) and the 12th (Tactical). The 15th was to carry the offensive deep into Germany, Romania, and Hungry with B-17s and B-24s. The 12th Air Force, together with RAF Mediterranean Command, would work in direct support of the ground troops in Italy. There the medium bombers—B-25s, B-26s, and A-20s—would best be put to work.

THE DIMENSIONS OF WAR

"It's absolute nonsense! If the figures were right, you'd be too! In that case I should have to withdraw from the eastern front forthwith and apply all resources to air defense. But they are not right! I will not stand for such nonsense!" Hitler, June 1943 raving against the intelligence brought to his attention by the head of the Night Fighter Defense. It stated that the American production figures were for 5,000 military aircraft a month.

1943 was a transitional year in the air war over Germany. In particular it saw the industrial might of the United States decisively thrown into the battle. The airforces in both Great Britain and North Africa began to swell with men and material. The build-up put the Allies in a position to truly go over to the offensive. General Eaker would have his "300 strong" bomber formations to penetrate German air space. Germany would soon find itself behind the production curve, however, not without first putting a black eye on the American offensive.

President Roosevelt was perhaps the only world leader that understood the true scale of an air war campaign. As early as 1938 he called for the production of 50,000 military aircraft a year. The economy and industry of the United States did all it could to oblige. Simultaneously, the military began a training program also that could fill all these mass produced aircraft with experienced pilots. Meanwhile, the factories of Germany were producing 700 aircraft a month. Its training program was staged only to meet the present need for pilots – and not any future need arising from stepped up production. To compound the situation, the German training program was biased toward bomber crews, which got the best trainees.

Historical Overview

At the height of the Battle of Britain the Luftwaffe could put up some 800 bombers across an entire front – an impressive number at the time. But by 1944 the Germans would see 1,000 bombers in a single raid at night followed by another 1,000 in a single raid by day.

America also had the technological advantage of a late start in the war. There is a given life span that any combat aircraft can survive. First there are the "teeth cutting" years, where an airplane that looks good on paper meets the realities of combat. Subsequent power plant changes and upgrades cause the aircraft to mature. Eventually newer power plants and greater demands upon the airframe exceed the original design and the aircraft becomes obsolete. The trick is for the aircraft to "peak" at the height of the war.

For example, the German ME-109 was the premier fighter aircraft in 1935. In 1940 despite a limited range, the 109E showed itself equal to what the Royal Air Force could put up against it. But by the end of the war the 109K was an airframe taken as far as it could advance .



The P-47 was affectionately known as the "Jug." It possessed a monstrous powerplant built into a frame that seemed only to engulf it in similar size. With heavy firepower, armor protection and an ability to out dive anything that pushed its nose down to escape, the P-47 would "break the back" of the Luftwaffe.

On the other hand, the P-38 was designed in 1938. The P-47 and P-51 were designed in the early 1940s at a time when power plants had grown in size and power and the demands to carry more weight into combat became evident. By the climax of the air war these aircraft were in their technological prime.

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Chapter Nine

Much of the technological gap was to due to the fact that Germany was not looking for a long war. It was looking to a lightning war, a "Blitz Krieg." In February of 1940 the Air Ministry put a halt to "all projects that have not reached the production stage within a year." All attention and resources were to be put toward present production—of present designs. The FW-190 barely sneaked past this ultimatum. Willy Messerschmitt openly defied it and continued research and development of the famous ME-262 Jet Fighter.

The first Jet Fighter Aircraft, a HE-178, flew for a public demonstration as early as 1939. After an initial false start the aircraft swept overhead. The whine of its turbine engines was deafening. But the Luftwaffe had already thundered over Poland. The comment was heard: "Before that comes to anything, the war will long since have been won."

In addition, the German economic and industrial base simply was not on a wartime footing until the middle of 1943. As late in the war as April of 1942, more than 90 percent of German industry was still functioning on a single shift. Factories still closed over the weekends and holidays were observed for the labor force. In 1943, German households still employed 1.4 million cleaning women!

More than blind faith in the outcome of lightning war, there were political incentives for Hitler to keep industry on a peacetime footing through this time. The German people were supposed to enjoy the fruits of the war. It was his promise to a people that accepted him as their leader exactly because of economic hardship endured in the Weimar period following WWI.

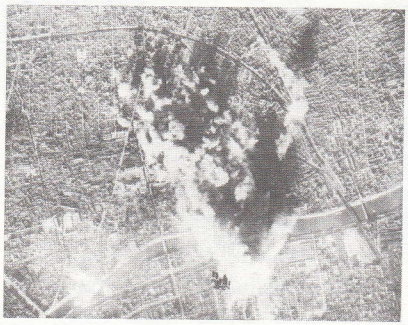


On the right, Adolf Galland, the "Fighter General," began as the commander of JG26 and rose to command the air defense of Germany in the west. He had 104 victories. Werner Mölders, pictured on the left, had 82 victories on the Western Front, 33 more on the Eastern Front.

Historical Overview

There were, of course, those who saw it clearly from the start. [illegible] Galland, who would eventually command the air defense of Germany, began asking that priority be given to fighter production already in 1941. Josef Kammhuber, the commander of the night defense in Germany, was asking the same. But Goering and his staff would hear none of it. Goering's adjunct was once to respond to a plea for more fighter production: "More than 400-500 fighters a month cannot be quartered at the front!"

Albert Speer, the German director of production, worked wonders for the German economy in 1944. While certainly effective in ramping up production, Speer looks good mostly because things were so serene up until this time. His success also confuses those who look for signs of success in the Allied strategic bombing campaigns against Germany. At the very time the Allies were seeking to diminish the production of German aircraft, the numbers grew quickly and tremendously. Armament production rose over 300 percent between January 1942 and July of 1944. Fighter production quickly grew from 350 per month in the summer of 1942 to 1,000 just one year later. But one need only take away all the bombing damage, all the pressure put upon men and resources to put out the fires, clean up the rubble, and defend the homeland, to find the real numbers behind it all.



Bombs impact their target and leave a wake of destruction. As fantastic as the explosions looked from the air, bomber crews had no idea of the damage they had really done.

After production was increased, the demands upon a veteran airforce were too much. The training schools were not up to the task of filling so many cockpits with experienced pilots. Particularly weak was the training given in instrument flying. This became so critical, of course, in hostile weather.

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Toward the end of the war there was not enough fuel, nor enough freedom from enemy fighters, to give new pilots the time they needed in their trainers. New pilots were committed to battle piecemeal and unprepared.

Germany was in no position to fight a war of attrition both against the Soviet Union on one front and Great Britain and the United States on another. The leadership of Germany simply had not come to grips with the war that had been presented her.

THE LUFTWAFFE AWAKES

"We will mete out to the Germans the measure, and more than the measure they have meted out to us." Loud and prolonged cheering interrupted his words. He continued with a direct challenge to Hitler, "You do your worst, and we will do our best." Winston Churchill, July 22, 1943

On July 24, 1943, deep in an underground operations room in Stade, Germany the night shift was on duty. The place was the technological brain of German night fighter defense. It was the center of a broad ranging central nervous system that could detect the slightest sensation of attack. What immediately drew your attention was a giant screen of frosted glass in the center of the room. The glass showed a map of Germany overlaid with a navigational grid. As enemy raids approached Germany, their paths were projected as little lights on this screen.

Extending out from this room, like searching tentacles, were volumes of radio and telephone lines that connected the frosted glass to radar sets, listening posts, fighter squadrons, search light regiments, and flak batteries. From the streams of conversation and activity in the room it is obvious that a raid is in the process. Even as the giant Wellington bombers switched on their radio sets on the runways in England, German listening posts were alerted to the oncoming mission—even to the very number of bombers in the attack.

Historical Overview



General Kammhuber was appointed "General of the Night Fighters" in May of 1941 and would establish vast and intricate line of defenses composed of searchlights, listening posts, radar stations, flak batteries, navigational beacons, and fighter groups. It would come to be known to both sides as the "Kammhuber line."

The British usually attacked late into the night so that their bombers would be returning by daybreak. This limited the dangers of landing at night. It was now shortly before midnight and the projections on the screen began to light up. They showed enemy bomber formations flying eastward over the North Sea, parallel with the coast. Night fighter planes were altered and ME-110s began taking up their line of defense across the "Kammhuber line." The game was to anticipate the bombers' objective. Which movement would be a feint? Which would be the real strike? In the control center, all eyes were fixed upon the technological wonder before them as it plotted the bombers' path.

But suddenly there was an eerie lack of motion on the screen. The plots were stationary. A call through to radar stations on the coast inquired. The same answer came from each station. "Apparatus put out of action by jamming." There were echo readings all over the coast. Both long-range radar and short wave radar, which directed the night fighters and the flak, were completely blind. The British had dropped a secret weapon called "window." Thin strips of silver paper exactly 26.5 CM in length were dropped by the thousands. Falling like leaves on an autumn day, separating and lilting to the earth, they formed a giant electronic cloud that hid the bombers from sight. Of 791 bombers that flew that night, only 12 failed to return for various reasons.



BOMBING AROUND THE

"I request to be reassigned to day
"Why?"
"I just can't see at night."
— 1st lieutenant Hellmuth Lent,
102 night victories in his ME-11

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For the next week Hamburg was the target. "Operation Gomorrah," as it was called, was to bring that city to its knees. The 8th AF would sortie 200 bombers the very next day and bomb the harbor. The next night another 722 RAF bombers reignited the fires. Subsequent night raids found the fires still burning, helping to direct incendiary bombs to their target. Hamburg was swallowed by what was later to be called a "fire storm". Temperatures raged to 1500 degrees Fahrenheit. Cyclone winds swept the city at 120 MPH and stoked the fires until only 20 percent of Hamburg's buildings remained intact. 40 million tons of rubble clogged the city center. 30,000 civilians, more than died in the atomic bombing of Nagasaki, were left dead.

This incident electrified the German Luftwaffe and put a recalcitrant enemy to work. Hitler himself was unmoved by the attack. He wanted only revenge and not more defense. But Goering and his staff were finally convinced a concerted air defense was needed by day and by night. The highest priority was given to the production of fighter aircraft. The allies now faced a committed opponent. The night attacks had awakened the giant from its slumber.



The Lancaster was England's principal night bomber by 1943. Its size was daunting and the amount of tonnage it could bring to a target was unmatched It could carry over 3 times the load of a B-17.

BOMBING AROUND THE CLOCK

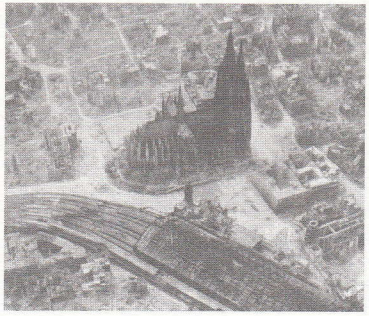
"I request to be reassigned to day fighters, Herr Major."
"Why?"
"I just can't see at night."
— 1st lieutenant Hellmuth Lent, 1941, who would go on to gain 102 night victories in his ME-110 and later HE-219.

Historical Overview

The RAF had decided early in the war that they were incapable of a day light precision bombing campaign. Early attacks against Germany brought attrition rates approaching 50%. Great Britain had no hope of a long-range fighter ever escorting their missions to Germany. The British bombers also were not bristling with guns at every quarter like the American B-17s and B-24s. And the top secret Norden bombsite the Americans so protected was not shared with them.

Therefore RAF Bomber Command retreated into the dark veil of night. The darkness not only hid them from the precision attacks of fighters but also hid their targets from sight. By default, Great Britain was committed to area bombing of civilian targets. Despite the often heard claim that Great Britain's area-bombing campaign was in response to Germany's Blitz during the Battle of Britain, the British committed to this tactic, and planned accordingly, long before Germany began bombing London.

Sir Arthur Harris, head of British Bomber Command, never apologized for this position. He said in his memoirs: "In no instance, except



Amazingly the cathedral at Cologne remains standing while surrounded by devastation.

Essen, were we aiming specifically at any one factory...The destruction of factories could be regarded as a bonus. The aiming points were usually right in the center of the town." "Bomber" Harris came to embody the British commitment to terror bombing at night. Under his influence, nearly 1/3 of Great Britain's manufacturing effort went to support the bomber offensive.

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Chapter Nine

The early night raids during the Battle of Britain and into 1942 had negligible impact upon Germany's ability to wage war. Yet they had a political impact felt by the German leadership. Already in 1940 Goering called the night defense the "Achilles' heel" of the Luftwaffe and quickly supplied men and material to stop up the gap. The ME-110 that proved obsolete over Britain found new life in the "Nachtjägergruppen" (Night Fighter Groups), referred to as NJG. Kammhuber was appointed "General of Night-Fighters," and given broad sweeping powers that enabled him to tap into tremendous resources to defend Germany against night attacks. He was not conservative in the expense of men and material to form up his complex lines of defense.

The night fighter's greatest success was in chasing the bombers down over their own airfields in England. The night fighters regularly slipped into the landing pattern and wreaked havoc upon the bomber stream. Two thirds of all night victories in 1940 through 1941 came during long-range interceptions over England. Yet Hitler forbade their continuance in 1941. He wanted the enemy bombers to fall upon German soil where the German people could witness their defeat. Such were the political tensions of the British attacks!

Unlike their American counterparts who flew in compact "bomber boxes," the British bombers came in almost single file in a steady stream of aggression. An hour and a half might pass from the first bombs to the last. German tactics were to set up individual fighters on patrol over a single radio beacon. These zones, called "Himmelbett," stretched right across the bomber routes. Like the British bombers, each fighter plane acted in isolation. They were often injected right into the central flow of the bomber stream by effective ground controllers.

However, the size of the British raids soon began to grow. The abilities of the British to coordinate larger formations of bombers at night had also improved. The Hamburg raid in July 1943 also demonstrated that with effective jamming the "Himmelbett" could be rendered ineffective. A new German tactic, called "Wilde Sau" was employed, dealing the British a terrific blow. Also new German aircraft were being produced, most exceptionally the HE-219 "Owl." It was a true night fighter.

Historical Overview

"Wilde Sau" was far less sophisticated and far more difficult to [illegible] than previous German tactics. The Germans massed their fighters—including single engine fighters—right over the target area where there were plenty of search lights. Operating above the flak, they were set loose like a "wild boar" among the bomber formations. About this same time new airborne radar sets—Liechtenstein SN2—gained a new lease on life with upgraded radar that were impervious to "window."

At what appeared to be the very height of Bomber Command's success its downfall began. A string of success lead up to this time—the dam busting raids, the attack on the top-secret laboratory in Peenemünde, and the bombing of Hamburg. But in a series of attacks upon Berlin late in 1943 and into January 1944, the British sustained constant losses that averaged 14% a mission. The British simply could not maintain such attrition rates. By their own admission it was a major defeat. Another great loss would be suffered in an attack on Nuremberg March 30, 1944. Of 795 bombers, 95 would fail to return, and most of these fell to fighters and not to flak.

Particularly distressing to Bomber Command was the ease with which the German night fighters could bring down the bombers once they were discovered slipping through the shadows of night. The Germans had invented an upward firing twin cannon that could be aimed from the cockpit and with the target directly overhead. They called it "schräge Musik," slanting music. The bottom of the British bombers were both unarmed and vulnerable. A few carefully placed rounds and the bomber was in flames, and the night fighter was safe. And no British crew could tell of the tale. The Germans suffered proportionally one fighter for one bomber shot down during the day. But at night the loss rate was closer to one fighter for four bombers.

Unlike the day campaign that saw the Luftwaffe gradually retreat, the night jadgers continued to be effective late into the war. Of the 126,000 Bomber Command aircrew who took part in the war 44% did not return. But even this did not stop the devastation of German cities at night. By April 1945 there were no more cities to burn.

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It is difficult to measure the impact of an operation that, even RAF Bomber Command admitted, was psychological in goal. The Casablanca directive again stated: "Your primary objective will be the progressive destruction and dislocation of the German military, industrial and economic system, and the undermining of the morale of the German people..." Sir Arthur "Bomber" Harris found ample room in that language for his terror campaign.

It was believed the civilian population was far less capable of enduring the hardships of a war. In time, and after many bomber attacks, the people would bring political pressure upon their leaders to put a stop to it. But the bombing of civilians often had an opposite effect. It awakened the German civilian population to the war effort and built animosity toward their enemy.

Even the British people at the end of the war were not all supportive of the night "area" bombing campaign. Long after Allied air superiority had been established over Germany, in February 1945, a pitiful raid was flown against the city of Dresden, population 600,000. The attack reduced the city to ashes in a series of blows. Lightly harassed by flak emplacements on the ground, and offered no opposition in the air, the heavy bombers raked the city from stem to stern. The attacks reduced the old cultural city, built mostly of wood, to ashes. As soon as the Dresden firestorm died out, another firestorm raged, this one among the Allies, once the severity of the destruction caused by the firebombing became known. Sir Arthur Harris quickly became a scapegoat.

At the end of the war "Bomber" Harris was denied peerage—the title of duke, marquees, earl, viscount or baron—given to all other major British commanders. His aircrews were denied a distinctive campaign medal of their own. The morality of their tactics was hotly debated and found wanting by the English themselves.

Nevertheless, his controversial raids did have an impact upon the German war machine. A serious commitment was made by the German Luftwaffe against the night effort. The commitment was enormous, not only in aircraft and pilots, but in the sophisticated ground coordination of radar, search lights, flak, and communications. Also the tremendous manpower that was arrested putting out fires and tending to the civilian population could not be won back for the factories and the war effort. This was a constant drain on the German economy and will.

THE BOMBER BARONS

From General Frederick L. Anderson, commander 8th AF Bomber Command: "To all leaders and combat crews. The air operation today is the most important air operation yet conducted in this war. The target must be destroyed. It is of vital importance to the enemy. Your friends and comrades that have been lost and that will be lost today are depending on you. Their sacrifices must not be vain. Good luck, good shooting and good bombing." An anonymous voice responded in the morning briefing: "And goodbye!" October, 14th, 1943 "Black Thursday."

At the Casablanca conference in January 1943, General Eaker sold Winston Churchill and the RAF on the American commitment for daylight, precision bombing. The British were adamant that the Americans should join them in area bombing at night. The clincher was Eaker's claim that the American bombers could hold their own against the German Luftwaffe and in the process they would be the very javelins upon which the Luftwaffe would impale itself. Eaker claimed that the heavily defended B-17s and B-24s would destroy large quantities of German fighters, which in turn would help establish air superiority over France for a cross-Channel invasion. The reasoning was far more compelling to the British than any nonsense about strategic, precision, bombing.

Glaring by way of omission was any mention of American fighters in the battle for air superiority over the western front. Eaker never mentioned this to Churchill or Roosevelt in Casablanca. He was thinking only of the bombers contributing to the battle for air superiority. It was still inconceivable that a fighter could reach Germany. Even so, Eaker was convinced that the heavily defended bombers would get through.

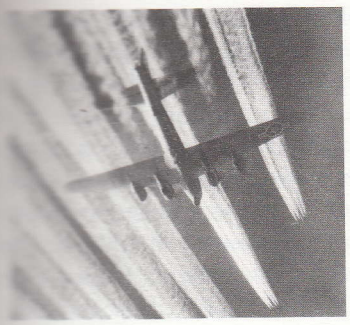
If one were to look at a "combat box" in flight and count up the number of guns that faced the enemy one would initially be optimistic of such claims. The "combat box" was formidable. Col. Curtis E LeMay, commander the 305th Bomb Group, perfected it. He was a decisive leader who insisted on intense training, which he personally supervised. He early on received the nickname "Iron Ass." Previous bomber groups were arranged to avoid flak, but LeMay insisted on straight and level flight over the target for bombing accuracy. He calculated the German guns would have to fire 372 shells to down a single bomber. Actually, it would take on average 5,000.



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B-17s pulling vapor trails behind them. Stacked vertically and staged to the left and right the gunners on each bomber had a clear line of fire. Courtesy of the 100th Bomb Group Photo Archives, Michael Faley.

Each combat box had 18-21 bombers in a group. Three groups formed a combat wing in the shape of a V staggered at differing altitudes. The lead group flew the center altitude. Another group flew 1,000 feet higher and to the side. The other flew 1,000 feet lower and to the other side. It would take 10 minutes for each combat box to bomb their target, thus saturating the flak guns with multiple targets to consider over a limited amount of time. The "bomber box" also had the effect of exposing some 540 machine guns, with a range of 800 yards, to all fields of fire. The firepower of the combat box and the hardiness of the individual bombers gave the formation the feeling of a "flying fortress."

Bomber crews tended to exaggerate the number of enemy kills exactly because of the compact nature of the combat box. A single ME-109 in flames could be claimed by 15 different gunners. The strict rules that applied to fighter pilots for confirmed kills were never carried over to bomber command. If the gunners were to be believed, the bombers were achieving a 6 to 1 kill ratio over the German fighters. But after the war General Adolf Galland would admit to a loss of one fighter to one large bomber brought down. That was hardly a promising trade considering the bombers held 10 crewmembers and the fighter pilots that parachuted often returned to combat the very next day. The gunner's claims were exaggerated. The bombers were doing little to achieve air superiority without fighter escort.

Despite his statements to Roosevelt and Churchill at Casablanca, a war of attrition was not foremost in Eaker's mind. He wrote in July 1943, "We play down the destruction of enemy fighters as the secondary job, our primary job being to deliver our bomb loads well aimed, on their targets." Eaker believed in strategic bombing. He was confident that critical industries could be crippled. He may have sold the British on the idea of knocking down German fighters, but he really was aiming to knock out German industry. B-17s and B-24s would bring Germany to her knees possibly before soldiers would be needed on the ground. At least that was what the "bomber barons" believed. The theory would soon be found unsound.

DICKE AUTOS

"At the sight of all these fighters, I had the distinct feeling of being trapped—that the Hun was tipped off, or at least had guessed our destination and was waiting for us." Lt. Co. Beirne Lay, August 17th 1943 on the raid to Regensburg. Lay would later co-author the screenplay for the movie "12 O' Clock High."

Already with the first B-17 and B-24 raids in 1942 the Germans had developed tactics to meet the challenge of the "dicke autos" (fat cars) as the pilots called the heavy bombers. A captured B-17 revealed that the forward armament both in terms of guns and protection was weak. The glass nose and cockpit was exceptionally vulnerable and the engines, of course, faced forward. JG 26 and 2 would perfect the "von Schnauze auf Schnauze" (snout to snout) attack. Outside of the defensive range of the bombers the German fighters would parallel the bomber's course. Then pulling ahead 5 Kilometers they would turn for a head on attack at the same altitude as the bombers. Closing at combined speeds of 500 MPH, the German fighters would pour in a steady stream of cannon and machine-gun and then roll away and down at the last second.

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Hermann Goering also gave specific orders that all attacks were to be concentrated upon the American bombers to the point of ignoring the fighters. The Germans would often wait until the very moment the bomber escorts turned home just inside the German border to commence their attack. This tactic had a devastating impact upon the American bomber boxes in 1943. Later, German fighters conducted feint attacks against the long-range escort fighters to encourage them to drop their belly tanks. With the extra fuel carried in the belly tanks gone, the escorts would soon have to turn around and go home.

Another key tactical decision was the usage of twin engine fighters as mobile artillery platforms. Rockets that could fire outside the range of the bombers' defensive guns were slung under the wings of ME-110s, 410s and JU-88 fighter-bombers. Against a compacted bomber box they could be deadly. They also provided the necessary tactical leverage to enable an opening for the single engine fighters. The rocket attacks opened up the bomber boxes and immediately the German fighters seized upon this adjustment. Their timing was impeccable.

Those who spent their time counting bullet holes in bombers began to see a marked increase in cannon fire by 1943. The Luftwaffe was gearing up for its primary target. Variations on fighter planes were showing a steady move toward more cannon and heavier armament. The newer FW-190A8 was given higher rate of fire cannons, more ammunition, and armored plate to protect the pilot. The ME-190G6/R6 or U4 had extra cannons slung under the wings. The ME-410 was a new high altitude bomber killer with four 20mm cannons and four machine guns.

The German Luftwaffe was in its prime and poised to strike a menacing blow against the advancing allied bombers.

DAYLIGHT BOMBING GETS A BLACK EYE

"We began to encounter enemy fighters when we were halfway to the target and had them almost constantly with us from there until we left the target area on the way out. There was every indication that the Germans were throwing just about everything they had in their inventory at us. We saw everything we had ever seen among those identification models we had hanging up back in our briefing room, and some we just couldn't identify...I thought I saw even a Stuka or two." Col. Maurice Preston, CO 379th Bomb Group, on the raid to Regensburg August 17, 1943.

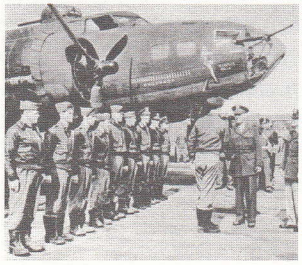
Historical Overview

By July of 1943 the American 8th Air Force had grown to 15 bomber groups. This gave Eaker his 250 bomber raids needed to penetrate German air space. The three fighter groups of the 8th AF—4th, 56th and the 78th FG—were equipped with the P-47C, which lacked sufficient range to escort the bombers past the Lowlands. On July 28th the 4th FG would be the first to employ drop tanks, but even these would only extend their combat range just over the German border.

In Germany the Luftwaffe defenses had stiffened. The force had grown from one Jagdgeschwader in Germany proper to eleven. This brought the total to 342 single-engine and 139 twin-engine aircraft by the end of 1943. The "Abbeville Kids," as JG26 was known to the bomber crews, was drawn back from the west front to Germany. They had the most experience and the most success facing the allied bomber boxes. JG54 came in from the eastern front where it had tremendous success. They would soon learn the West Front was a different story. Victories on the Russian front were not counted as highly as victories here. But their success would continue, nevertheless.

"Blitz Week," as it would be called, began the end of July. Good weather cleared the way for an all-out effort deep into the heart of Germany by the 8th Air Force. 1,000 B-17s and B-24s struck 15 different targets –all in Germany. The operation cost the Army Air Forces 97 aircraft—a loss rate for the week of 10 percent. Losses were exceeding the rate of replacement. Worse, there were no signs of a weakening Luftwaffe. The Army air force did not to recover the losses for two weeks. In the meantime, the 8th Air Force was forced to stand down.

It didn't take long for the bomber crews to do the hard math. They were to fly 25 missions before rotating home. (This was changed to 30 missions in 1944). Yet by their eleventh mission their number was already up. Through the summer of 1943 the statistic held true. The much-celebrated "Memphis Belle" was the first B-17 aircrew to survive this brutal math in June of 1943. But most succumbed to the statistic.



The crew of the Memphis Belle take their 26th mission back home to sell war bonds. (USAF)

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Chapter Nine

Nevertheless, the bomber offensive continued into the fall of 1943. On August 17 the offensive mustered its largest force yet, 315 heavy bombers. The target was Regensburg, deep in southern Germany. It was a coordinated attack with the Ninth Air Force attacking in Rumania and Austria. The Luftwaffe rallied with a massive counter attack. For six grueling hours the German fighters attacked free of the America escorts. American gunners claimed over 300 fighters shot down. The Luftwaffe only lost twenty-seven. Sixty heavy bombers were shot down. 19% of the total attacking force was destroyed.

After recovering from their losses, the Eight Air Force struck again September 6th. The target was Stuttgart. Losses were again heavy—45 heavy bombers, representing 17% of the attacking force were lost, not including those damaged or put out of commission.

Bad weather gave the aircrews a much-needed break. The weather didn't clear again until early October. Four more attacks struck into the heart of Germany, far beyond fighter escort, the cities of Bremen, Anklam, Marienburg, Munster. The climax came on Thursday, October 14th, "Black Thursday."

At the time, allied commanders believed ball bearing production was critical industry that would have a domino effect on all other industries. After all, what wasn't a ball bearing used in? What machine didn't depend on this little part? Schweinfurt was responsible for the largest portion of this production. It had been struck three months before, but with little effect. Again, Schweinfurt, and its ball bearings, were the target.

It was a very complex raid, which was quickly undone by the English weather. The plan was for the 1st and 3rd bomb Divisions to cross Holland on parallel tracks 30 miles apart, while the 2nd bomb division, composed of 60 B-24s would fly to the south. The 923-mile trip would last just over seven hours and meant that the B-17s of 1st Division would be equipped with extra fuel tanks in the bomb bay. Each division would be escorted by a P-47 group while yet another group was held in reserve for withdrawal support. 370 miles of the route would be flown without fighter support.

Historical Overview

Overcast skies piled up to heights of 6,000 feet on October the [illegible]. Most of the B-24s never made their rendezvous point. The B-24s were then redirected over the North Sea as a diversion. Then they turned back. The B-17 groups faired no better. Valuable fuel was wasted circling the groups into formation above the towering overcast. 15 of the 164 aircraft in 1st Division and eighteen aircraft of the 160 aircraft in 3rd Division either turned back with mechanical problems or became lost in the cloudy conditions. The bombers were ten minutes behind schedule. The fighters were not. This shortened their time with the bombers.

The German Luftwaffe sortied 567 times, sending fighters up two and three times in the day. Their first attacks began over Walcheren Island. Even before the American fighter groups turned for home ME-109s and FW-190s came down from 34,000 feet. Thunderbolt pilots from the 56th FG stood their ground and met the attack at 31,000 feet, an altitude at which the P47 had the advantage over the enemy fighters. They would claim 10 fighters shot down and another five damaged or destroyed. But only a few minutes later the Thunderbolts were at the limit of their range. It was either turn back or take a swim in the English Channel.

As soon as the Thunderbolts departed the Luftwaffe pounced with some 300 to 400 enemy fighters. The bombers were exposed to withering firepower, first from rocket attacks from a distance and then immediately followed up by single engine fighter attacks. They were attacked almost constantly until they reached the target. Then the flak took over. A single burst could bring the big bombers down and a near miss could put one out of formation. But the bombers pressed on and dropped over 480 tons of high explosives and incendiaries on target. No sooner than they turned for home and left the cover of flak, another group of FW 190s were waiting. It would be a long trip home.



Flak was unnerving because bomber crews did not maneuver to avoid it. They simply flew through it level and straight to drop their bombs on target. That made them an easy mark. By the middle of 1944 more bombers fell to flak than enemy fighters.

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CHANGING OF THE GUAR[illegible]

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Sixty Fortresses and their 600 men were missing by the end of the day. 17 more bombers crashed in England or were so badly damaged they were written off. The casualties represented 34% of the entire force. 121 more bombers required repairs. Five fatalities and forty-three wounded crewmen were removed from the returning aircraft. The Luftwaffe lost only thirty-five fighters and of these, many of their pilots parachuted to safety. Production at the ball-bearings plant was interrupted only six weeks and the German war machine had enough reserves to cover the loss in production. As with many other German industries, dispersal had already begun.

The "Mighty Eighth" had been brought low. It did not venture into Germany again in any size through the end of the year. Months passed before the 8th recovered the losses sustained in a raid that can hardly be said to have achieved its goal of halting ball bearing production and produced little to lift the sunken morale of the airmen.



The 100th Bomber Group would come to be known as the "bloody 100th" for its excessive losses on several missions. At times almost an entire squadron was wiped out leaving only one B-17 to return. Posing for the camera is the crew of "Picadilly Lily" September 21, 194. Courtesy of the 100th Bomb Group Photo Archives, Michael Faley.

CHANGING OF THE GUARD

"Our mission is to bring the bombers back." Read a sign on 8th AF Fighter Command. General Doolittle informed the commander, "From now on that no longer holds. Your mission is to destroy the German Air Force."

During the fatal raids of 1943 an American aircraft company, intoxicated by a rich dose of patriotism, sponsored an advertisement that didn't sit too well with the airmen of the Eighth Air Force. It was a full-page advertisement that showed a grinning gunner peering through the sites of a .50 caliber machine gun as he poured tracers into a swarm of Focke-Wulf Fighters. Beneath the heroic painting was the caption: "Who's Afraid of the Big Bad Wulf?"

Historical Overview

One pilot who saw the page immediately tore it from the magazine and pinned it to his group's bulletin board. Beneath the page was a long scroll with a big red-lettered headline: "WE ARE!" Every combat officer in the group signed below, and the group commander's name headed the list. They mailed it to the manufacturer with their blessings.

The idea of the "self-defending bomber" had been put to rest. All but the most recalcitrant "bomber barons" admitted to the need for long range fighter escort. It was also realized that new tactics were to be employed to put the fighters to best use. Unfortunately, General Ira Eaker was unconverted. He declared the Schweinfurt raid a success.

On December 26, 1943 Eaker stepped down. A command was waiting for him in North Africa. Gen. Jimmy Doolittle took his place January 6, 1944.

Doolittle wasn't a pure bomber man. He wasn't given to any controlling ideologies, but was a practical leader who lived close to his men. As a reservist he wasn't like the other commanders and was not accepted quickly. He was immediately criticized for canceling too many missions due to bad weather.

General Spaatz, his superior officer allegedly challenged Doolittle, "I wonder if you've got the guts to lead a big air force. If you haven't, I'll get someone who has." Doolittle then took his superior up in a B-17 to demonstrate his point. They took of in inclement weather. When they could not find their way home due to heavy cloud cover they landed in a cow pasture. General Spaatz supposedly conceded Doolittle's point.

In any case, it mattered little now that the weather was so poor. The goal was no longer precision bombing. The goal was air superiority. Anything that brought the Luftwaffe up to fight was worth the effort. General Eisenhower was now in England and his was the main act in the show now. The invasion of Europe was set for May of 1944, just five months away.

Doolittle's first major decision was to set the fighter's free. He considered it the most important decision of his military career. No longer strapped to the bombers, the fighters were free to range out along the bomber path and attack the German fighters at will and pursue them to the deck. Even after their escort duties were over they were to range over the enemy countryside looking for targets of opportunity.

Chapter Nine

The "Mighty Eighth" recognized a new rising star in its ranks. No longer was the bomber the key aircraft in its arsenal. The long-range escort was now the principle weapon in the war for air superiority. The heavy bombers were once thought to be the mighty hammer of Thor pounding away at Germany's industrial might. But now the fighters were the mighty hammer and the bombers were the anvil upon which the steel of the Luftwaffe would be flattened and brought into submission.

LITTLE FRIENDS

"General, give me those Mustangs and I give you my word — I'll have 'em in combat in 24 hours. I promise — 24 hours." Col. Blakeslee, commander 4th FG. Blakeslee promised his CO that his fighter group could transition to the new P-51B without taking the group off line. When his men were excited to see the sleek new mustangs he said, "You can learn to fly 'em, on the way to the target." They had only 40 minutes in the Mustang before they flew it into combat at the close of "Big Week" February 1944.

One of the most successful fighter groups of the war was the 56th Fighter Group, commanded by Col. Hub Zemke. The group achieved the highest number of Allied air to air victories. The 4th FG was to surpass this number, but only by adding victories achieved by strafing targets on the ground. More importantly, the 56th developed the tactics that changed the course of the air war. They were proud of their P-47s and worked to demonstrate it as a true air superiority fighter despite it huge size and weight. That 2,300 horse Pratt and Whitney engine gave it giant lungs at 30,000 feet and it brought its pilots home.



Hub Zemke, staring into the camera with a thoughtful gaze, was a tactician who was forever analyzing the dynamics of air combat. His innovations gave birth to .a very successful fighter group—the 56th FG. Pictured to his right is General Doolittle.

Historical Overview

Even before Doolittle "set the fighters free," Zemke was ranging his squadrons in advance of the bomber formations. They often caught the Luftwaffe forming up their huge battle groups that were so essential against the American bomber box. Just a few Thunderbolts could send the German fighters into disarray. The twin-engine fighters, lugging extra cannon and rockets and clawing for altitude, were particularly vulnerable to attack. Men like Gabreski, Johnson, and Schilling rose up through the ranks and became aces to be feared. (Aces represented only 5% of the entire 8th Air Force, but they would claim 40% of the planes shot down by fighters. Almost 60% of the fighter pilots never claimed a single enemy plane shot down.)



Robert Johnson scored 27 aerial victories over Europe. He is pictured here in his "razorback" P-47C. The later P-47D would feature a bubble top canopy for better vision.

At first the bomber groups didn't notice anything had changed. But soon they saw their "little friends" as they liked to call their escorts, leaving their sides. At first the bombers protested, but soon the results began to show. The Luftwaffe began having greater difficulty rallying against the bombers in any size or any force. Most of their attacks were blunted. Due to the success of the new tactics, the Luftwaffe and ability of her pilots was beginning to suffer from a war of attrition. By March of 1944 the attrition rates for the bombers began to fall off noticeably.

Another tactic was phased escort. The Allies learned that by attaching escorts to the bomber groups at different times they could extend the range of the fighters significantly. Fighter groups came in successive waves like workers at a factory coming in on shifts. And if the fighters missed their appointment with the bombers, they instead swept out along the Bomber path, clearing away Luftwaffe defenders.



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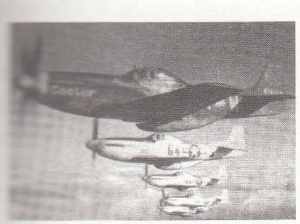
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Chapter Nine



The P-51 was one of the sleekest aircraft designs of the war. It rose to become the symbol of air superiority over Germany. It was mass-produced far more reasonably than the Lightning or the Jug, and was superior in combat range and maneuverability at high altitude. It was also exceptionally fast.

It was about this time a new aircraft was injected into the war, one that would forever leave its mark. The P-51 "Mustang" was already in production in 1942, but was considered only fit for reconnaissance and air to ground attack because its Allison engine just didn't have the lungs to take it above 15,000 feet. But this sleek airframe was soon mated with the famous Merlin engine, the engine that made the Spitfire's claim to fame. Rushed into production, the first P-51Bs began to show up in December of 1943.

Surprising was the fact that the Mustangs were slated to go over to the 9th "Tactical" Air Force to prepare for the invasion of Europe. Doolittle saw that this order was changed. He also ordered that every fighter group convert to the P-51 for continuity. Hub Zemke got an exemption for his 56th FG. They kept their beloved "Jug." The changeover took time and the new Mustangs would take some time "cutting their teeth." But when the American ranks began to swell with the new P-51, the Luftwaffe was made to shrink back and recoil from the blows. The Luftwaffe were not prepared at all for such a long ranged fighter aircraft. Especially not one so nimble and fast. It was a dream to fly and a nightmare to face at high altitude. Even after the drop tanks were gone, the 51 could still linger over the battlefield and chase its opponents down.

Also during this time the new P-47D gained longer legs and even deeper lungs. The P-47 still served as the workhorse of the 8th AF until transition to the new Mustang was complete in the fall of 1944. The P-51 was not available in sufficient numbers until after the major retreats of the German airforce. General Kepner, commander 8th Air Force Fighter Command, put it this way: "If it can be said that the P-38 struck the Luftwaffe in its vitals and the P-51s are giving it the coupe de grace, it was the Thunderbolt that broke its back."

After the transition to the new Mustang was complete, the P-47s were transferred to the 9th Air Force where they quickly received the new nickname "Thunderbomber". The P-47 was well suited to the ground attack role. It was fantastic as a dive-bomber and it could easily absorb ground fire and still bring its pilot's home. The few P-38 groups the 8th Air Force had were also turned over to the 9th Air Force for the tactical role.

OPERATION ARGUMENT

"As time went on, we were knocking off some of the best boys the Germans had out of the war. We were knocking off some of the best German pilots, primarily because we didn't know better. We didn't know we were supposed to be afraid of these guys and that they were so much better than we were. We went after them and we got them." Robert Johnson, 56th FG, ended the war with 28 victories.

When the Allied invasion fleet crossed the English Channel on June 6, 1944 there wasn't a quarter of the horizon that wasn't darkened by the silhouette of a ship of some kind. As far as the eye could see a great armada was gathered to bring from its belly a vast army to breech Hitler's "festung Europa." Steven Ambrose, an historian of the D-Day invasion, compared the feat of moving so many men and so much material across the channel to taking the entire population of Milwaukee, every man, woman and child, plus their cars and trucks, and moving them across Lake Michigan. Then unloading them again on the other side—all in one day. The proportions of the invasion were enormous.

A skeletal Luftwaffe, a handful of bombers and fighters, could have wrecked havoc upon such an enterprise. Even a couple of bombs dropped somewhere near those small troop transports would have stirred up a commotion upon a grand scale. Several thousand men could have been sunk to the bottom of the channel in but a few moments. Or what if they only took a picture to give the German Army? The true thrust of the invasion would have been uncovered. Hitler held valuable resources further to the north for days thinking the invasion was only a feint. But only two FW-190s showed up over the British beaches that morning. Josef "Pips" Priller, JG 26, and his wingman, took one pass over the beaches, fired a few rounds, and quickly returned to the clouds from whence they came and sped away.

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Chapter Nine

This is what "Operation Argument" was all about. Its purpose was to establish air superiority over the battlefield both by knocking down fighters in the air and bombing the fighter production industry on the ground. Primary targets were the German aircraft industry, ball-bearing production plants, and anything that created sub components that supported the aircraft industry. Fighter escorts were to do most of the hard work, however.

Poor weather kept Doolittle's 8th Air Force from bringing the Luftwaffe to bear in this dedicated battle of attrition. It was to be one of the harshest winters in Germany in years. Few missions took place in January. But then a high-pressure system built up over the continent and by February 20 six days of fair weather held influence over the war. The six days came to be known as "Big Week" as the United States went into a maximum effort.

By February of 1944, the Luftwaffe could boast 350 single-engine, and 100 twin-engine aircraft, including 50 night fighters, for the defense of Germany. This force wasn't any larger than the one that humbled the Mighty Eighth in the fall of 1943. But the combined Allied air forces in England and North Africa could boast 1,180 heavy bombers and 676 fighters. In October 1943 the Americans put up 5,694 sorties. They put up 17,038 sorties in February 1944. The Luftwaffe would be powerless against the flood.

On February 20th, 880 B-17s and B-24s from 29 Bomber Groups were sent against 12 separate targets in central Germany. 835 Fighters from 15 Fighter Groups accompanied them on the trip. The weather was less than optimalfor the German pilots. Their skills in instrument flight were not as sharp as their adversary's, in large part due to Germany's crushing need for pilots and the consequent lack of thorough training. By now the American bombers could bomb through thick clouds using radar. Only 2.2% of the entire force failed to return for all reasons. RAF Bomber Command also joined in this series of attacks on the German aircraft industry and its vital components.

On the 22nd a third heavy raid was launched deep into Germany. But this time the Luftwaffe changed tactics and was able to administer heavy losses. Instead of waiting near the target, they hit the bombers early in their track. This caught the heavy bombers in more relaxed formations and without much of their phased escort. The Americans had been cheating the Luftwaffe by phasing more and more fighters at the point of the usual German attacks.

On the 25th, the last day of "Big Week," the targets were the aircraft industries in Regensburg, Augsburg, and Furth, and on the Stuttgart ball-bearing factory. The first strike at Regensburg, with 149 B-24s, sustained heavy losses (39 bombers and 3 fighters). But a follow-up strike to the same target was largely ignored. The famous ME-109 plant was leveled to the ground.

By the 25th, the Eighth and Fifteenth Air Forces had flown 3,800 sorties (500 from Italy) and dropped more bombs than the Mighty Eighth had in its whole first year in England. 137 bombers were lost from the 8th; 89 from the 15th. This would represent 6% of the total force and disproportionate were the losses to the 15th AF, which did not always have fighter escort. 75% of the buildings attacked in the German aircraft industrial system were considered destroyed. In addition, 600 Luftwaffe airplanes were claimed as destroyed in vicious air battles over Germany.

Before "Big Week," the Americans could only muster a single large mission and then would have to retreat to lick their wounds. But now the Germans knew their enemy was strong and could sustain a maximum effort over a period of several days. Immediately the Luftwaffe admitted defeat and conceded the skies. No longer would they hound every mission from beginning to end. They would choose when to defend carefully.

Allied air power grew bolder at every step. A week later Berlin, Big-B, was the target for another week and it drew up the Luftwaffe aggressively to be melted before a battle of attrition. German forces were even drawn from the Russian front and thrown into the fray.

The German Luftwaffe at times could not even penetrate the tight fighter screens. Neither could they form up large formations in advance of the bombers without interference. The Americans had begun to coordinate fighter sweeps through ground radar, and later did so from controllers in the bombers themselves. There were few if any rocket attacks from the twin-engine fighters anymore. But the Luftwaffe was a determined foe. Total losses were 10% for the Americans. But their losses were soon recovered. The German's were not. That, of course, is the point of a war of attrition.

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OPERATION OVERLORD

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The American bombers never again tried to conceal their targets. There were no more feints and diversions. The javelin was thrust directly at its foe. They didn't even bother to camouflage their fighter or bomber aircraft anymore. Aircraft were as bright as the sun, glistening in their natural metal finish. It made for added speed and easy recognition. Why should they hide any longer? They would dare the Germans to come up!

By March 1944 the goal of Operation Argument was realized. The American bombers were losing more planes to flak than to German fighters. The German Luftwaffe could challenge the Allies firmly but only at a single point in the sky and only for a short duration of time. Over those three months the Luftwaffe lost 2,121 aircraft to all causes. It was the first time they would lose more fighters than they could produce. Worse yet, they lost 28 "experten"—8 of whom had shot down 162 heavy bombers alone—and many other veteran pilots who could never be replaced. The factories were out producing the training schools both in number and quality of product.

OPERATION OVERLORD

"When they hit a locomotive there is a big spurt up in the air—and that fascinates a fellow, you know. We weren't allowed to shoot anything up in France then, but over Germany we got what we called a 'Choo-Choo mission.' I think we got 229 locomotives claimed destroyed and about the same number damaged. We know how that demoralized the transportation system in Germany. Immediately after that, approaching D-Day then, we got orders to go after the transportation for a shot time in France." General Kepner, commander 8th AF Fighter command.

General Dwight Eisenhower arrived in England in January 1944. His mission was to prepare for the invasion of Europe. Operation Argument was a nod to the need for air superiority over the battlefield, but Eisenhower then wanted more. Both RAF Bomber Command and the 8th Air Force where reluctant to accept his goals. They were "strategic" airforces, after all. They bucked and resisted direction once the bridle was set. But Eisenhower pulled the reins.

Transportation would become the vital organ of the enemy now. Eisenhower wanted targets that would have an immediate and not a long-range impact upon the battlefield. The targets would be mostly in northern France. Bridges, railways, lines of communication and local airfields would take a pounding from the heavens.

Also, returning fighter aircraft intensified their low level strafing attacks, conducting what some called "unorganized air guerrilla warfare." They were given free rein over the treetops of Germany and France. German aircraft on the ground were easy to find though sometimes heavily defended by lighter anti-aircraft fire. On April 5th, one fighter-bomber mission would claim 10 enemy aircraft destroyed in the air and 88 on the ground.

Special black and white invasion stripes were painted on all allied aircraft so that they could be easily identified from the ground. But on June 6th, Eisenhower told the invasion troops, "If you see fighting aircraft over you, they will be ours." The German rail system was also a wreck. There was no way a counter offensive could be launched quick enough once the Allied intentions were clear. And they became clear all too late. The Wehrmacht was transported mostly by foot, or horse drawn vehicle, and any motorized movement was always at night.

British and American heavy bombers were also employed directly against ground troops. "Carpet bombing" had a tremendous impact upon the battlefield. Flying wingtip to wingtip, they would lay their bombs down in a concentrated pattern. The bombing disrupted ground troops immediately and left them demoralized. One German panzer commander commented: "The entire area resembled a moon landscape, with the bomb craters touching rim to rim....All signal communications had been cut and no command was possible. The shock effect on the troops was indescribable. Several of my men went mad and rushed round in the open until they were cut down by splinters."

Carpet bombing was not, however, strategic, precision bombing. Sometimes allied troops were laid under the carpet as well. The strategic airforces of the United States and Britain were eager to move on to strategic targets once again.

THE OIL CAMPAIGN

"This job is a dangerous mission, but we feel that if the refineries are demolished, and the entire [B-24] force wiped out, it will still be worth the price." General Lewis Breten, addressing the Ploesti Raiders, August 1, 1943.

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Allied intelligence was ever peering into a crystal ball searching for that critical industry. In the process many industries were attempted, but none seemed so vulnerable than the oil industry. Germany had no natural resources for oil. It was very aggressive in North Africa for this reason, as well as in Southern Russia in the offensive of 1942. The Nazi allies to the south and east, in Hungry and Rumania, supplied the single largest source of crude oil. But even before the war, Germany was wise in pursing an industry of synthetic fuels. They were able to convert coal into fuel through a chain of refineries in Germany itself.



At first glance, the ball-bearing works at Schweinfurt appears ruined. But amazingly, under the wreckage, the vital organs of the industry were found intact.

When the ball-bearing factory at Schweinfurt was bombed it was hit directly by eighty-eight 500-pound bombs. Both the Allies and the Germans believed the target was devastated. The Allies should have returned for another raid, however. For after clearing through the rubble the Germans found the vital industrial machines intact and simply built a new roof over them. It was also easy to store up large reserves of ball bearings, or other such critical components that were not easy to find from the air. Greater damage was usually done by fire than by high explosives. But fuel oil, being what it is, proved an easy mark.

The first lunge at this critical artery were the Ploesti raids (Operation Tidal Wave) from North Africa in 1943. The raids were heroic—almost one-third of the first attack force was lost—but nevertheless ineffective. Coming in at low altitude, minus a bottom gunner, and loaded more with extra fuel than sufficient bombs, the damage on the ground looked greater than it proved to be. One plant suffered a 42% reduction in capacity, but within a month it was repaired and operating at the same capacity as before.

Historical Overview

The industry was largely ignored again until 1944. A few raids took place, despite the priority put upon transportation systems. But after Operation Overlord, the attack on the synthetic fuel industry picked up in earnest. The flak was waiting for them and so were the German fighters. At Pölitz, for example, the Germans mustered some two hundred and seventy 105mm and 88mm guns.



Crewmembers of the 491st bomber group gather for a briefing. Most of them never return.

November 26th the target was Misburg. The synthetic oil refineries had been partially destroyed three weeks before. It was a follow up raid and the enemy was waiting. The weather was perfect. More than 350 German fighters converged on the ingress point (IP) of the bombers. A gap was discovered in the bomber formations and the escorts were spread out. The Germans began to tear into the bomber formations.

The 491st Bomb Group was to be the last over the target and it found itself without fighter escort. Hoping to slip into the heavy flak that the German fighters did not normally enter they suddenly heard the guns go silent. In the still distance they could see more than 100 fighter planes assembling for a coordinated strike. This was the beginning of the bomb run. Each squadron dropped their bombs by radio frequency on the lead bomber's mark. One entire squadron—the 854th—dropped its bombs early due to some malfunction. They missed their target by 15 miles. The squadron commander decided to pull away from the target and any new flak zones and make their way home. FW-190s set upon them and began to break up the squadron formation, making matters worse. Only three of the Liberators came home from the squadron. Only twelve remained from the whole group.

Early in the oil campaign Germany's ministrer of production, Albert Speer's, realized the impact. With reference to the May 1944 attacks on the "ersatz" oil-production facilities he said: "On that day the technological war was decided. Until then we had managed to produce approximately as many weapons as the armed forces needed, despite their considerable losses. But with the attack of 935 daylight bombers of the American Eighth Air Force on several fuel plants in central and eastern Germany, a new era in the air war began."

In the winter offensive, the "Battle of the Bulge," the full impact of the oil campaign was revealed. Hitler's tanks had made a move for a huge American fuel depot in the hopes of capturing it. It was a crucial part of the Ardennes offensive for the Tiger Tanks didn't even have enough fuel to reach their final objective—the City of Antwerp. The Tigers didn't capture the depot. Many of the tanks were set on fire and abandoned. Their crews retreated on foot.

By the end of the war German oil output was 5 percent of the previous year's production. Jet fighter craft were even seen being towed to their takeoff positions by teams of horses to preserve fuel.

SECRET WEAPONS OF THE LUFTWAFFE

"The first time I ever saw a jet, I shot it down."

— General Chuck Yeager, USAF, describing his first confrontation with a ME-262.

On November 26, 1943, a demonstration was finally arranged. The ME-262 Jet Fighter was show cased for the master-mind of Germany's repeated success—Adolf Hitler. Adolf Galland himself had championed this new aircraft. "It's like flying on the wings of an angel," he said. It had already approached speeds of 625 MPH. It would eventually be equipped with 4 30mm cannons all concentrated in the nose. It could dominate the skies.

The Jet aircraft thundered and soared through the air and impressed all that watched. Hitler was in a good mood and caught his entertainers off guard: "Can this aircraft carry bombs?"

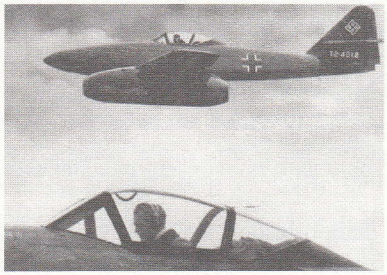
Willy Messerschmitt said, "Yes."

Of course, any aircraft could be fitted with bombs in a pinch. He was going to say more, but he hesitated as he began to think through all the implications.

But it was too late. Hitler did not let him utter another word. He trumpeted: "So there at last is our blitz-bomber!"

The ME-262 never could carry bombs effectively. The attempts to make it do so would keep it from its destiny for yet another year. To be sure, the project had already been stalled by others who failed to see its real potential. They would not listen to the people who knew for what it was designed. The first flight of the Schwalbe (Swallow) was in July 1942! The project had been stalled several times before Hitler almost entirely side-tracked it. But necessity would bring it back to production as a fighter aircraft.

300 ME-262s got into operation before the war's end. The first Jet Fighter group went operational November 1944, commanded by Major Walter Nowotny who had accumulated 255 aerial victories over the Russian front. But it was a considerable amount of time before the pilots were ready for combat. At first Nowotny could only sortie three or four of the jets at a time. Yet over the period of a month these few aircraft brought 22 victories.



Two Swallows in flight were enough to penetrate any fighter screen once they got to altitude. The trick, of course, was getting there. Sometimes a whole Geschwader of FW-190Ds would have to defend the swift jet fighters as they took off and began their climb to altitude.

In 1945 General Adolf Galland formed his own elite band of Jet fighters into Jagdverband (JV) 44. The ranks were filled with aces and commanders who had lead forces three times this size. It was an absurd squadron full of generals, colonels and majors. Though only built up to squadron strength, they had little difficulty penetrating fighter screens and coming among the allied bombers themselves. On each pass the bombers fell from the skies like flaming apples shaken from a tree.

The Allied reaction was to hunt the Swallows from their barns. Their airfields were constantly bombed and enemy fighters patrolled them day and night. The German secret weapon was very vulnerable upon take off and landing as it needed an enormous take off roll for a fighter of that day. It was slow to accelerate as well. The American fighter planes, though no match for the secret weapons of the Luftwaffe, still could out number them and out position them. The jets were hounded furiously and became something of a trophy kill.

A more radical design was the ME-163 Komet, a rocket powered glider. It was designed as a point defense for key industries. It was nearly 100 MPH faster than the ME-262 and climbed at a fantastic rate clear up to the level of the bomber groups. But only 300 were built and only 9 victories were accredited to them.

A STRATEGIC AIRFORCE SCORES A TACTICAL WIN

By 1945 both RAF Bomber Command and the Eighth Air Force would no longer resist tactical assignments. Most of the strategic targets were gone or dispersed. The Eighth Air Force flew its last major attack April 1945. Leaflets were dropped before the raid in Czechoslovakia to allow workers to escape.

The air war was over before the ground war had ended. Command of the skies had opened the door for the Allies to invade. The irony was that a strategic air force was most successful in a tactical goal—the achievement of air superiority over the battlefield.

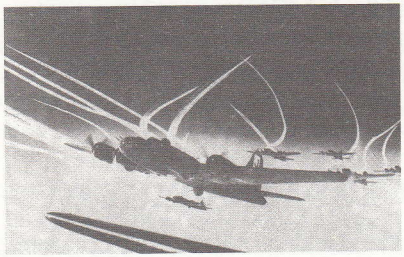
The German Wehrmacht feared the tactical impact of Allied airpower most of all. It kept them from piling a mass of tank and infantry divisions at a single point so they could go over to the offensive. Unless, of course, the weather gave them the cover of secrecy as in the winter of 1944. Movement by day or by train was closed down to them.

It is difficult to credit success, despite the claims of German leaders after the war, to the strategic bombing of industry. The production rates soared at the very time the bombing campaign was at its peak. When the numbers finally dropped noticeably, the war was already being won on the ground. The Ardennes offensive, the "Battle of the Bulge," in the winter of 1944 was the last breath of a dying German Army.

The German Luftwaffe was geared toward a tactical war and had no committed strategic defense until it was too late. If the ME-262 could have been in production by 1943. If the aircraft factories, and pilot training programs, would have realized the true proportions of an air war... but those things were never realized.

In the final analysis, the very ideal the Allied Airforces resisted was the one to which they succumbed. The strategic airforce won the tactical victory that won the war. The cost was tremendous. The sacrifice is, hopefully, not forgotten.

Historical Overview



"Little friends" weave over top the bomber formations because they cannot fly at the same slow speed as the bombers. Such a sight was always welcome to the bomber crews.

BIBLIOGRAPHY

Astor, Gerald. *The Mighty Eight: The Air War in Europe as told by the men who fought it*, 1997

Bekker, Cajus. *The Luftwaffe War Diaries: The German Air Force in World War II*, 1994

Bowman, Martin W. *Great American Air Battles of World War II*, 1994.

Boyne, Walter J. *Clash of Wings: World War II in the Air*, 1994.

Caldwell, Donald L. *JG26 Top Guns of the Luftwaffe*, 1991.

Caidin, Martin. *Flying Forts: The B-17 in World War II*, 1990.

Caidin, Martin. *ME-109 Willy Messerschmitt's Peerless Fighter*, 1968.

Dean, Francis H. Editor. Report Joint Fighter Conference NAS Patuxent River, MD 16-23 October 1944

Delve, Ken. *Nightfighter: The Battle for the Night Skies*, 1995.

Goebel, Robert J. *Mustang Ace: Memoirs of a P-51 Fighter Pilot,* 1991.

Green, William. *Famous Bombers of the Second World War*, 1959

Green, William. *Famous Fighters of the Second World War*, 1957

Hammel, Eric. *Aces Against Germany*, 1993.

Hoyt, Edwin P. *Angels of Death: Goering's Luftwaffe*, 1994.

Keegan, John. *The Second World War*, 1989.

Spick, Mike. *Allied Fighter Aces of World War II: The Air Combat Tactics and Techniques of World War II*, 1997.

Stanaway, John. *P-38 Lightning Aces of the ETO/MTO.*

Weal, John. *Focke-Wulf FW-190 Aces of the Western Front,* 1996.

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IX. AIRCRAFT D

ALLIED AIRCRAFT



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Equipped with the AI Mark
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IX. AIRCRAFT DESCRIPTIONS

ALLIED AIRCRAFT



Bristol Beaufighter IF and VIF: The twin-engine Beaufighter reached service one year after its first flight in July 1939. Designed as a long-range night fighter with a heavy, fixed forward-firing armarment (four 20mm cannon and six .303 calliber machine guns), the Beaufighter IF was a powerful and durable aircraft quite capable of shooting down anything that crossed its path. However, it was prone to a take-off swing, making it somewhat dangerous to fly, and this defect was never fully corrected.

Equipped with the AI Mark IV radar and a dorsal observation position, the Beaufighter appeared in small numbers with Fighter Command just as the German Blitz began to heat up and Dowding needed more and capable night fighters. The Beaufighter also operated as a day fighter with a Coastal Command (Mark IC) in the Battle of the Atlantic where its relatively lang range allowed it to hunt down German maritime bombers. The aircraft was produced throughout the war, serving in different roles in many theatres.



de Havilland Mosquito (all types): When de Havilland proposed their new high-performance light bomber in 1938, its design was considered too unconventional by the Air Ministry and was, at least temporarily, shelved. Not only was it intended to fly so fast that it could dispense with any kind of defensive armament, it was to be constructed entirely of a material that was time-honored, but revolutionary for this type of aircraft in its day and age: wood.

Fortunately, by the time the BEF had been evacuated from Dunkirk, wiser heads prevailed and the project (originally a private venture by DH) went ahead. Reluctant Air Ministry officials had no choice but to be impressed when the prototype demonstrated an impressive series of climbing rolls right after takeoff...with one engine feathered! Based in part conceptually (if not in detail design) on the fabulous prewar Comet racer, de Havilland's "Wooden Wonder" soon proved itself in combat.

Historical Overview

The first airplane to enter service, the prototype photoreconnaissance Mosquito PR.Mk I, made its first operational flight as a daylight recon over the coast of France on 20 September 1941—and handily ran away from the three Messerschmitt Bf-109s which attempted to intercept it.

The "Mossie's" unconventional construction also demonstrated advantages far beyond the original intent to preserve strategic materials such as light alloys. Not only was it able to soak up a remarkable amount of punishment on the rare occasions when someone managed to get a Mosquito in his sights, it also provided significant savings in construction labor. The fuselage was molded, with all its compound curvature, in two halves, and all internal systems (plumbing, wiring, control runs, etc.) were installed very easily before the halves were bonded together.

In service, the Mosquito design proved to be remarkably versatile, with PR (photorecon), B (bomber), FB (fighter-bomber), and NF (night fighter) variants in bewildering profusion. There were even Sea Mosquitos that could operate from aircraft carriers. Bombers had a glazed nose for the bombardier and could carry stores underwing as well as internally, while fighters and night fighters had forward-firing armament and various marks of AI (Airborne Interception) radar. Some high-altitude night fighters had extended wingspans and pressurized cabins. All Mosquitos were powered by various versions of the immortal 12-cylinder Rolls-Royce "Merlin."

A couple of specialized uses of the Mosquito are worthy of mention. One is that of "pathfinder": for many of the RAF's night bombing missions (particularly when the weather over the target was bad., Crews from special Pathfinder units (each consisting of a highly experienced pilot and a "Master Bomber") would streak in over Axis targets at low level, depending only on their astonishing speed for (relative) safety, to mark the targets with long-burning colored flares.

The other specialized use was for the transportation of special VIP passengers (mostly diplomats and the occasional spy), as well as bags of ball bearings manufactured in neutral Sweden, the RAF actually ran a "Mosquito Airline" between Scotland and Sweden through most of the War. One can only imagine the thoughts of the passengers, shivering in their blankets, deafened by the howl of the two Merlins, and unable to see out of the hideously uncomfortable cabin modified from the bomb bay, as they felt their Mossie taking evasive action on the occasions when the "airliner" encountered a German patrol.



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Boeing B-17 "Flying Fortress" (all models): During most of the 1930's, the USA maintained a policy of military isolation. None the less, various officers realized that the time would undoubtedly come when there would be a need for long-range strategic bombers. As early as 1935, the US Army issued a specification for such an aircraft. Four years later, Boeing flew their prototype Model 299. The 299 became the ancestor of what many consider the definitive American strategic bomber of World War II: the B-17.

Equipped with turbocharged engines, the B-17 was intended to use high altitude as a defense against enemy fighters. On its first operational sortie with the RAF, bombing Wilhelmshaven on 8 July 1941, this proved an erroneous idea; even at 30,000 feet, the aircraft were vulnerable to attack by Me.-109s. A few months later, however, America entered the war. Since Japan's rapid advance into the Pacific islands meant that, at least initially, strategic bombing of the Home Islands would be beyond the range of the B-17, most of the aircraft produced were diverted to Europe to serve with the 8th Air Force, where the B-17 became the backbone of the Allies' day bombing strategy.

Bristling with up to 13 heavy .50-caliber machine guns for self-defense, the B-17 soon proved that its sobriquet of "Flying Fortress" was well earned. Due to the ball turret in its belly, it was one of the first bombers capable of resisting attacks from below. Later models such as the B-17G could carry a bombload of almost 18,000 lbs—half the empty weight of the airplane!—deep into the Reich. With its four rugged air-cooled engines, the Fort was able to absorb an astonishing amount of punishment and still bring its crews home—sometimes with only one or two engines, and with major pieces of airframe completely shot away. Flying Fortresses served with distinction in every theater of World War II; ultimately, almost 13,000 would be built.



Martin "Baltimore": Named after the Martin company's home city, this handy light bomber was developed from the company's earlier "Maryland" specifically to meet British requirements. Early versions had only a single hand-operated gun in the dorsal position; this was later replaced with either a Boulton Paul hydraulic turret with four rifle-caliber machine guns, or an electric Martin version with a pair of .50-cals. In RAF service the aircraft was used exclusively in the Mediterranean and North African theaters.



Consolidated "Liberator" (all models): For many, the image of an American bomber in the ETO will always be that of the B-17. It may come as a surprise, then, that the Liberator was built and operated in much larger numbers...indeed, at a final count of some 19,000, more Libs were built than any other US warplane.

Based on the long, narrow "Davis" wing, the design was optimized for high speed at high altitude, where Liberators proved very effective as reconnaissance aircraft (RCM model) as well as bombers. Even so, it was also used quite extensively for low-altitude raids at long range. Undoubtedly the most famous of these were the very costly missions launched from Benghazi, in Libya, against the Romanian oilfields and refineries at Ploesti, northwest of Bucharest. Of the 177 Liberators launched on that raid, 55 were lost and 53 were damaged, with over 400 crew killed or captured.

Both the RAF and the USAAF operated Liberators. Coastal Command (as well as the US Navy) used them extensively for patrol and antisubmarine missions, and as such missions were flown at low altitude, their Liberators often deleted the turbochargers used on the high-altitude airplanes. A special liberator, named "Commando," was the personal transport of Prime Minister Winston Churchill.



Vickers "Wellington" (all models): The Wellington medium bomber entered RAF service as early as October of 1938, and by the outbreak of WWII the following September, eight squadrons were fully equipped and production was underway on what would end as a total run of almost 11,500 airplanes.

Designed by the remarkable Barnes Wallis (who would later invent the "skip bombing" technique used in the famous "Dam Buster" raids), the Wellington used a technique of diagonal light alloy braces under a fabric fuselage covering called "geodetic construction." Looking, when uncovered, like a giant version of the woven-straw "Chinese Finger Torture" toy, the method used a minimum of strategic light alloy materials; crews joked that at high airspeeds the fuselage would become perceptibly longer and narrower! Affectionately nicknamed "Wimpey" (after J. Wellington Wimpey, the cigar-smoking hamburger addict of the "Popeye" cartoons), the Wellington formed a major component of the RAF's night bombing campaigns until supplanted by heavy four-engine bombers later in the war. It took part in the first attack against Germany, and remained in service throughout the War (indeed, soldiering on as a trainer well into the 1950s).



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Short "Stirling" (all models): First of the RAF's heavy four-engine bombers to enter service (August 1940) and first to be used operationally (February 1941), the massive Stirling was also the first to be removed from service (September 1944) as the later Lancaster and Halifax took over. Capable of lifting a 14,000 lb bombload and speeds only slightly inferior to those of the B-17, the Stirling was hampered by a service ceiling of only 17,000 feet, making it easy prey for both fighters and larger AA guns. In addition, bomb bay size limitations precluded it from carrying some of the larger "Tallboy" and "Blockbuster" weapons developed later in the war.

Stirlings continued to serve as transports and glider tugs throughout the war



Handley Page "Halifax" (all models): Looking not unlike a mid-wing version of the Liberator, the Handley Page Halifax was the second of the three great British heavy bombers to dominate night operations over the Reich. Based on an unsuccessful design for a medium/heavy bomber (HP.55) which was to have been powered by two of the then-untested 24-cylinder Rolls Royce Vulture engines, the prototype Halifax was powered instead by four 12-cylinder Rolls Royce Merlins. (The same engine was to power a remarkable number of RAF aircraft, including not only the Lancaster and Mosquito bombers, but also the Hurricane and Spitfire fighters.)

Initial production versions of the Halifax were powered by Merlins. Early operational experience suggested that they were somewhat lightly armed, with only rifle-caliber machine guns in the nose, tail turret, and beam positions. A dorsal turret was soon added, but this—together with sundry other operational "improvements"—so increased the airplane's weight that its performance, already modest to a fault, became unacceptable.

This changed with the introduction of the Halifax B.Mk.III, in which the dorsal turret was eliminated and the Merlins replaced with air-cooled Bristol Hercules XVI engines of 1615 hp. each. Although to some extent overshadowed by the exploits of the Lancaster, which went into service a year later, the Halifax marked up some significant firsts, including the first installation and operational use of the secret H2S radar bombing system, which allowed bombs to be dropped "blind" at night or through clouds with a fair degree of accuracy.

Historical Overview

Like several other RAF heavy bombers, the Halifax proved so useful that it was not scrapped when more capable bombers were introduced, but rather was relegated to support roles such as patrol, transport, or glider tow. Halifaxes served with distinction with Pathfinder units, and were the only aircraft capable of towing the big Hamilcar assault glider (which could carry the specially-developed Tetrarch light tank). The famed attack on the German heavy water factory in Norway was inserted via a pair of Horsa gliders towed across the North Sea by Halifax.



Bell P-39 "Airacobra": Developed just before the beginning of WW-II, Bell's P-39 pioneered a number of interesting design highlights. As larger and better-defended bombers and fighters were developed by both sides, it became evident that a powerful cannon would be a significant advantage. To some extent, the P-39 was designed around such a weapon, the 37mm T-9. The large and heavy gun was installed just ahead of the cockpit, which required relocating the Allison engine to the center of the airplane, propeller drive being provided by a shaft passing below the cockpit to a gearbox in the nose. The propeller shaft itself was hollow, with the cannon barrel passing through it on the airplane centerline. Additional armament included a pair of .50-cal. machine guns in the nose, and, later, an additional pair in underwing locations. Moving the engine to the "amidships" position also allowed installation of a tricycle landing gear; the P-39 was the first American fighter to be so equipped.

Unfortunately, a decision early in the design process to delete the General Electric turbosupercharger relegated the Airacobra primarily to ground-attack and close support roles. Although RAF 601 Sqn was equipped with Airacobras (replacing Hurricanes), they soon proved inadequate in terms of climb rate and ceiling; 601 Sqn replaced them with Spitfires less than a year later. (The British version of the P-39 was equipped with a 20mm cannon and .303 machineguns for the sake of ammunition commonality with other RAF types.) A large number of P-39s was later supplied to Russia; at the lower fighting altitudes common over the Eastern Front, it proved effective in both fighter and ground-attack roles.



Martin B-26 "Marauder": Sometimes confused with the somewhat similar Douglas A-26 "Invader" (q.v.), and powered by similar R-2800 Double Wasp engines, Martin's Marauder showed such promise on its initial design study that the US Army made the unprecedented decision to begin production immediately, rather than waiting for the construction and evaluation of prototypes.

The initial aircraft proved to meet their specifications, particularly for high speed—but at the cost of such demanding low-speed handling that the unofficial motto of one Florida B-26 training squadron was, "One a Day in Tampa Bay." Another source of potential trouble was that just about everything on the airplane was powered and controlled by a sometimes balky electrical system. A German nickname applied after the examination of crashed examples was "Das fliegende Kraftwerk" ("the flying power station").

The spate of training accidents resulted in the formation of a special investigative board, which recommended changes in both the Marauder's aerodynamics and in its handling techniques. This ultimately resulted in the Marauder's having the lowest attrition rate of any aircraft assigned to the 9th AF, operator of most of the Marauders in the ETO (the RAF also operated over 500 "Lend-Lease" Marauders). USAAF Marauder operations were initially based in North Africa, from where they were extremely effective over Italy, Sicily, Sardinia, Corsica, and southern France.



Avro "Lancaster": Certainly the finest heavy bomber operated by the RAF, and arguably the best aircraft in its class operated by any of the combatants in WWII, the Lancaster survived a somewhat inauspicious beginning. Avro had originally developed a twin-engine bomber, the Manchester, powered by a pair of the troublesome 24-cylinder Rolls Royce Vultures. While a number of these entered squadron service, their performance and reliability both proved so disappointing that work began to modify the design to four of the ubiquitous, and highly reliable, 12-cylinder Merlins. The result, the Lancaster, in the words of one British chronicler, "went from strength to strength."

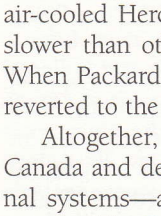
Historical Overview

As the RAF (with a few exceptions near the end of the war) persisted in giving the Lanc only rifle-caliber machine guns as defensive armament (and never developed a ventral ball turret for it), the Lancaster was used primarily in the night bombing role. It was the only bomber capable of carrying the monstrous 22,000-lb "Grand Slam" bomb, which could knock out hardened targets like bunkers and submarine pens.

Even the Lancaster's big bomb bay could not entirely accommodate the huge cylindrical "skip bomb" developed to attack the dams providing water and power to the Ruhr, heart of Germany's industrial might, and Lancasters specially modified for the famous "Dam Buster" mission had about half the bomb protruding from their fuselages.

Lancaster production "ramped up" to the point at which a shortage of Merlin engines was threatened. The Lancaster Mk. II was developed to use air-cooled Hercules radials on the same airframe. This aircraft was a bit slower than other Lancs, and its bomb load was reduced by two tons. When Packard-built Merlins from the USA became available, production reverted to the Merlin-powered variants.

Altogether, 7377 Lancasters were built. Of these, 430 were built in Canada and delivered "naked"—i.e., without armament and some internal systems—across the Atlantic. A transport version, the Lancastrian, was used by Transport Command during the war; toward the end of the war, another transport, the York, used Lancaster "running gear" with a new fuselage.



Curtiss P-40 "Kittyhawk": Best known to WWII buffs for its record in China with the American Volunteer Group, and clearly outclassed by later Allied designs, the venerable Curtiss P-40 none the less served with distinction in both RAF and USAAF colors. However, its relatively low performance—particularly at high altitude—made it something of a "minor player" in the air war in Europe. While most aircraft utilized the Allison V-1710 engine, some 1300 P-40Fs flew with the V-1650 Rolls Royce Merlin (license-built by Packard in the US).

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Douglas A-26 "Invader": One of the outstanding designs of World War II, the Douglas Invader was, to some extent, a scaled-up version of the same firm's A-20 Havoc/Boston series (q.v.). Equipped with a pair of 2000-hp Pratt & Whitney R-2800 Double Wasp engines, it was the fastest US bomber of World War II and was outstripped, among Allied bombers, only by the much smaller and lighter de Havilland Mosquito.

Unlike the Mossie, however, the Invader was anything but unarmed. In addition to a 4000-lb bombload, even the basic bomber version (with a glazed nose for the bombardier) carried a basic outfit of four .50-cal machine guns in low-profile remote-controlled upper and lower turrets and two more in the nose. "Hardnose" versions carried up to six.50-cals in the nose, with more yet in underwing and fuselage trays, making the A-26 a formidable ground-attack and close-support machine. Although "glass nose" and "hardnose" versions were officially different aircraft types, a number were converted back and forth in the field.



Lockheed P-38 "Lightning": Another of World War II's true success stories, the famed P-38 twin-engine fighter was developed with almost unbelievable speed by Lockheed's famous "Skunk Works, " lead by the famed Kelly Johnson (later the author of such remarkable airplanes as the P-80 jet fighter, the U-2 and SR-71 reconnaissance airplanes, and the F-117 "Stealth Fighter"). It was a stunning response to a US Army specification for a heavily-armed, high-performance, long-range escort fighter. Johnson and his colleagues recognized early on that these requirements were beyond the capabilities of a single-engine airplane. This resulted in the Lightning's characteristic layout of twin booms housing the engines, joined at the rear by a single horizontal tail, and at the front by the large wing housing the pilot and armament in a streamlined center "gondola."

This arrangement offered a number of advantages. The large size of the airplane meant it could carry enough fuel for deep escort missions (especially when using drop tanks); the twin engines meant that it was very resistant to battle damage (pilots called the second engine "the round-trip ticket"). Perhaps most important, the center location of the gondola, with no engine obstructing the nose, gave the airplane devastating firepower: four .50-cal machine guns plus a 20mm cannon.

Since all the guns were in the same location, their fire was concentrated at any range (rather than converging, then diverging beyond optimum range, as was the case in aircraft with wing-mounted guns). Because of the twin boom layout, the Germans called the airplane "der Gabelschwanzteufel" (Fork-tailed Devil).

Major variants of the P-38 in the ETO included the basically similar –J and –L fighter versions and the unarmed F-5 and F-6 photo-recon versions.



Republic P-47 "Thunderbolt": Among the most successful American fighters used during World War II (with no fewer than 15,677 built), the massive P-47 was nicknamed the "Jug"—some say for its rotund shape, others claim it was an abbreviation of "Juggernaut." Starting with its big R-2800 radial engine (the same as used in the A-26 and B-26 bombers, and equipped with a turbosupercharger located in the aft fuselage), the Jug continued on an appropriately grand scale, weighing in at almost 10,000 lbs empty and up to 18,000 fully loaded (almost twice and three times, respectively, the equivalent weights of a typical early Spitfire!). Early P-47s ("razorbacks") had a multi-pane sliding canopy and "turtle deck;" later models, including the most numerous P-47D variant, had a "full vision" bubble canopy.

Basic armament was composed of eight .50-cal. machine guns. In addition, up to 2500 lbs of external loads could be carried, including drop tanks for long-range missions or bombs, rockets, or napalm for ground attack purposes. In its fighter role, the Jug's combination of extreme ruggedness and massive firepower gave it enviable combat records: a loss rate of only 0.7% per mission, and a kill ratio (enemy aircraft destroyed for each Thunderbolt lost) of 4.6.

Powerful as it was, the Jug was also big enough to be overloaded—particularly for long escort missions. It was happiest at bases with good-sized runways, and a contemporary was to quip that, "If the Army could build a runway around the Equator, Republic would build a fighter that couldn't take off from it."

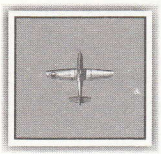


Supermarine "Spitfire": Few combat aircraft have attained the glamour associated with the Spitfire, which it earned not only for its defensive victory in the Battle of Britain but for its fine looks and excellent performance. Entering RAF service n 1938, the Spitfire I was light and agile. Its eight .303 caliber Browning machineguns could spray a total of 160 bullets per second, so even inexperienced pilots had a chance of hitting their target. Most pilots aligned the eight guns to converge their fire at about 250 yards (the fire would then diverge at distances beyond that). However, like the Hurricane, the Spitfire carried only enough ammunition for 15 seconds of firing. Short bursts of two or three seconds duration were the norm, though novice pilots (and there were many in the Battle of Britain) fired longer bursts and at ranges of 500 yards or more.

The Spitfire was very much a short-range fighter like its principle opponent the Bf109. The two combatants were nearly equal in air combat-any disadvantage being offset by some advantage. For instance, the Bf109 had a direct fuel injection system (the Spitfire's Rolls-Royce Merlin engine had a carburetor), but the Spitfire had a bubble cockpit canopy which gave the British pilot a better field of vision. A squadron of Spitfires could scramble to 20,000 feet in 13 minutes, faster than any other RAF fighter, which made the Spitfire a vital asset to the British air defenses.

Spitfires composed one-third of Fighter Command aircraft during the battle, filling out 19 squadrons in July 1940. Of these, one squadron (the 611 at Digby) was equipped with the modified Spitfire IB. Only 30 of the Mark IB were produced. They carried two 20mm cannons and four .303 caliber machineguns. The long barrels of the cannons, and the blisters on the wings over the 20mm ammunition drums, adversely affected the aircraft's performance. There were also some operational problems with the first series of 20mm cannons, as they had been copied from foreign design.

Meanwhile the Spitfire IIA was also entering service, retaining the eight machinegun battery but with an improved Merlin engine. By Spring 1941, the Mark VB had been introduced. It carried the mixed armament that the Mark IB had carried but with all the bugs worked out. The Spitfire VB could beat the Messerschmitt Bf109F-2, but it was often outclassed by the Focke-Wulf Fw 190A-2. The Spitfire VB became the mainstay of Fighter Command up until mid-1942. Improved variants of the Spitfire were continuously designed and produced throughout the war.



North American P-51 "Mustang" (all models including A-36 Apache): Another success story coming on the heels of very rapid development, the P-51 Mustang (and its ancestor, the A-36) started from an urgent RAF request for a combination ground attack and fighter aircraft. Designer Edgar Schmued and his team completed the basic layout and detail design in less than the allotted 120 days. The first aircraft, powered by Allison V-1710 engines, were exported to England as Mustang Is. The Allison's relatively poor high-altitude performance proved a disappointment. At the same time, however, the airplane's excellent flying qualities recommended it for both the low-level reconnaissance and ground-attack roles, the latter resulting in the development of a specialized version with dive brakes, the A-37 Apache.

Meanwhile, however, both North American and the RAF experimented with the installation of the ubiquitous and splendid Rolls Royce Merlin. The Merlin's two-stage supercharger brought sparkling high-altitude performance, and the airplane came into its own as the premier American fighter in the ETO. Between the "straight-back" –B version and the "bubble canopy" P-51D, almost 15,500 found their way into service (the last hundred or so built under license, after VJ day, in Australia).

Few Allied aircraft, save perhaps the Spitfire, had the emotional appeal of the Mustang. With its clean lines, bubble canopy, and big fuselage scoop for oil and coolant radiators, it just "looked right." Armed with six .50-cal. machine guns, it had adequate firepower, and equipped with drop tanks, it could escort Allied day bombers all the way into the targets and back out again.

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As important, perhaps, was its pleasant and relatively viceless handling, allowing even relatively inexperienced pilots to acquit themselves well in combat. Present-day Mustang owners—about 100 of the type are still flying—are at pains to convince admirers that the airplane "can be a real handful," but let's remember that it was often flown (very successfully!) in combat by 19-year-olds with less than 200 hours total flying time!



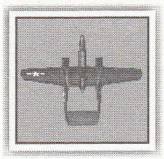
Hawker "Hurricane": The Hurricane I was Great Britain's first monoplane fighter, joining the service in late 1937. With a fixed forward-firing battery of eight .303 caliber machineguns, retractable landing gear, and a top speed far exceeding that of contemporary bombers, it was the type of modern fighter Britain desperately needed to make her new air defense system complete. The Hurricane also had a unique airframe construction of fabric and tubular metal that allowed it to absorb punishment in its fuselage that would have been fatal to an all-metal stress-skinned fighter like the Spitfire or Bf109 (the Hurricane did have a metal-skinned front fuselage and, by 1940, metal-skinned wings).

A squadron of Hurricanes could scramble to 20,000 feet in 16 minutes, which was slightly slower that a squadron of Spitfires. The Hurricane was easy to fly and also a steady gun platform. For these reasons, the Hurricane was often assigned to go after German bombers while its younger and abler sister, the Spitfire, tackled the German fighters. Though the Spitfire would receive much recognition during and after the battle, the Hurricane was Britain's workhorse fighter at the time, making up two-thirds of Fighter Command's strength in 1940. It destroyed more enemy aircraft in the Battle of Britain than all the other defenses combined-in fact, some sources credit the Hurricane with 80 percent of the kills.

The Hurricane's Merlin engine had a carburetor system instead of the direct fuel injection that the German Bf109 enjoyed. As a consequence, centrifugal force would starve the engine for a beat as the Hurricane went into a dive. Because of this, and because of the Bf109's superior speed and better climb rate, the Hurricane often had to accept air combat on terms set by the Bf109, as the latter could escape more easily in any direction. However, the Hurricane's turning radius was inside that of the twin-engine Bf110, which gave the British aircraft an advantage over the German heavy fighter.

Historical Overview

The Mark IIC became available in late 1940. It had a more powerful Merlin engine, and for armament it carried four 20mm cannons instead of machineguns. As the Spitfire replaced the Hurricane in the fighter role, the latter was used effectively as a fighter-bomber and tank buster. The Hurricane served in the European theatre until 1943 and in the Far East until the end of the war. By the time of its final delivery in September 1944, over 14,200 Hurricanes had been produced.



Northrop P-61 "Black Widow": Looking vaguely like a P-38 on steroids, Northrop's three-seat heavy fighter was the US's first attempt to develop an aircraft specifically for the radar night fighter role. As such, it carried a crew of three: a pilot, a full-time operator for the complex and balky radar equipment of the era, and an aft-facing gunner who operated a remote-controlled "barbette" dorsal turret containing four .50-cal. machine guns. This turret could also be locked in the forward-facing position and fired by the pilot to augment the massive main armament of no less than four 20mm cannons in the forward fuselage.

It was later found that the turret, when slewed to the "beam" position, caused an unacceptable tail buffet. As a result, the turret was often left in the locked-forward position (and the gunner left home), and for part of the production run the turret was deleted altogether (restored for the last 250 airplanes). On its first engagement in Europe, the Black Widow knocked down four German bombers. It could also carry four 1600-lb bombs (or four 300-gallon drop tanks) on underwing pylons. With its 2000-hp R-2800 engines, it had a sufficient turn of speed to chase down and destroy the German V-1 "Buzz Bomb," and was used to good effect in this role during the Germans' attack on Antwerp.



Douglas A-20 "Boston" and "Havoc": Produced as a twin-engine bomber by the Douglas Aircraft Company in the United States, the Havoc I was exported to France in 1940 where it first saw combat. It was considered fast and modern. After the Battle of France, Great Britain began to import Havocs and convert them to night fighters, adding flame dampers to hide the engine exhausts and painting the aircraft in dark schemes. The Havoc I had a glazed nose; later versions (called Bostons) would have a solid nose filled with half a dozen guns and carry a 4,000-pound bombload.

The aircraft also served with distinction with the U.S. Army Air Corps (it was known as the A-20 in the U.S.). Of the 7,385 produced by Douglas, more than 40 percent were exported to the Soviet Union during the war. Production ceased by the end of summer 1944.



Hawker "Typhoon" and "Tempest": Although the prototype Hawker Typhoon first flew in 1940, early problems with both the airframe and its complex 24-cylinder Napier Sabre engine kept it out of operational use until September of 1941. Even then, it became evident that not all the problems had been solved; several airplanes shed their complete tail units, with concomitant loss of aircrew, and there was talk of shelving the design altogether.

By the time the problems were resolved, it had also become evident that a poor rate of climb would relegate the Typhoon to the low-level role—but in that role, it proved a formidable weapon. With four 20mm cannon in the wings as well as provision for underwing stores, the Typhoon became a very effective fighter-bomber, ranging over France and the Low Countries and attacking German communications and liaison facilities. When equipped with unguided rockets, it was also very effective against light shipping such as the German E-boats operating in the Channel. As such, it played an invaluable role in the invasion of Europe.

Meanwhile, Hawker's chief designer, Sydney Camm, was addressing the Typhoon's shortcomings. A thinner, more efficient wing was designed, incorporating the engine coolant radiators to replace the Typhoon's rather draggy "chin" installation. A fuselage fuel tank was added to replace the capacity lost in the wing, the design was generally refined, and the powerplant improved. Originally it had been planned to call the new airplane "Typhoon II," but the changes proved so extensive that the name "Tempest" was adopted instead.

Performance improved drastically. The airplane was still at its best at relatively low altitudes—but there, it was fast enough to knock down 481 of the 1847 V-1 flying bombs destroyed by fighters between June 1944 and March 1945. As Tempests advanced into Europe along with ground troops after the Invasion, they also destroyed some 20 of the Luftwaffe's new Me.-262 jet fighters (q.v.).

After the war, the Tempest design was further refined and slightly scaled down to produce the Hawker Fury and Sea Fury, a number of which are still flying at present.

Historical Overview



North American B-25 "Mitchell": This workhorse medium bomber debuted at the beginning of the US's involvement in World War II, and served throughout the conflict in both the ETO and the Pacific. Perhaps its most famous mission in the latter theater was the famous "30 seconds over Tokyo" raid led by Col. Jimmy Doolittle, when 16 B-25s launched from the aircraft carrier Hornet carried the war back to Japan only five months after the attack on Pearl Harbor.

In Europe, both the RAF and USAAF operated B-25s. The standard version was armed, in addition to its bombload, with .50-cal. machine guns in the nose, tail, upper, and sometimes lower turrets. For ground attack, these could be supplanted by four to six forward-firing machine guns in fuselage blisters. A potent anti-shipping version (used primarily in the Pacific) was armed with no less than a 75-mm cannon, firing forward through the former bombardier's position.

AXIS AIRCRAFT DESCRIPTIONS



IAR 80B: Few realize that in the period between the World Wars, Romania developed an extensive indigenous aircraft industry. The IAR 80 and 81 were Romania's most advanced fighters during World War II and were stationed to help defend the Ploesti oilfields against Allied attack.

Only the IAR 80B and 81C are represented in ***Bombing the Reich***. Both were attractive monoplanes powered by a 1025-hp IAR radial engine. The 80B was armed with four 7.92mm and two 13.2mm machine guns (approximately equivalent to .30-cal. and .50-cal., respectively), while the ground-attack version, the 81C, carried a single 250-Kg. bomb on the fuselage centerline, four 50-Kg bombs under the wings, four 7.92mm machine guns, and two 20mm Mauser cannons. They performed best at low altitude. As most of Romania's airfields were unpaved during World War II, the IAR fighters retained a tailskid, rather than a tailwheel. In all, some 430 variants of the IAR 80 and 81 were built at the Brasov factory in Transylvania before production was phased out in favor of Messerschmitt Bf.-109Gs built under license (if not under duress!).



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He 162A: As Germany grew ever more desperate during the closing months of World War II, a number of last-ditch aircraft designs were rushed toward completion. The Heinkel 162A "Salamander" was a light turbojet fighter, utilizing a single BMW turbojet with 1764 lbs of thrust. Constructed largely of wood and other non-strategic materials, it was armed with two 20mm cannons.

Early prototypes (the first flew in December 1944) showed stability problems—hardly surprising given that only five weeks had elapsed since the factory received detail drawings! Within four days the prototype crashed, but within another five weeks two further prototypes were in the air (January 1945); they were delivered to operational evaluations units (Erprobungsgruppen) the same month.

An initial group of three squadrons was formed in northern Germany on 4 May 1945 and equipped with 50 Salamanders. Four days later, the British occupied their airfield. Over 100 Salamanders were built, and parts for a further 800 were found in Germany's infamous underground factories. One can only speculate, as in the case of the Me.-262, what the outcome might have been had these airplanes become operational earlier in the War.



Messerschmitt Me.-109 (various models): During the period between the Wars, when the development of German military aircraft was forbidden, Willy Messerschmitt was hard at work on future fighter designs. His very successful prewar four-seat tourer, the Me.-108 "Taifun," was so close in general conception to the later Me-109 (more correctly, Bf-109, for "Bayerische Flugzeugwerke"—"Bavarian Airplane Factory") that those few Taifuns still flying today are often painted in military colors and used as economical Me-109 "stand-ins" in historical movies.

Early 109s were "blooded" serving with the Kondor Legion during the Spanish Civil War. By the outbreak of WWII some 1,000 were in service, and by the end of the War, some 35,000 had been produced, a figure second only to the claimed 42,000-odd IL-2 and IL-10 "Shturmovik" ground-attack fighters built in Russia. The major production variants were the E, or "Emil," and G, or "Gustav," models. These used Daimler-Benz 601 and 605 engines, respectively.

One of the advantages of these engines was their direct fuel injection. When threatened by Allied fighters, the –109 pilot could simply push over and accelerate away in a dive. Allied engines, by contrast, were equipped with carburetors; the negative G of a push-over would cause their float valves to close and the engine would temporarily cut out unless the Allied pilot first performed a half roll, then "pulled down" into the dive. In either case, the –109 could gain a significant lead.

For a relatively lightweight fighter, the –109 was heavily armed. The G versions typically carried four heavy 13mm machine guns (equivalent to the Allied .50-cal.) and three 20mm cannon. The short range that had plagued them during the Battle of Britain was less of a factor when they were employed as point-defense interceptors in Europe. A continuing problem, however, was their narrow landing gear. Intended to minimize structural loads to the wings, it gave the airplane very demanding ground handling characteristics. Almost as many 109s were lost to takeoff and landing accidents as to enemy action.



Me-163B "Komet": Prior to the outbreak of World War II, Germany was considered the leading scientific nation in the world—particularly in the fields of chemistry and advanced aerodynamics. Perhaps in an effort to maintain this pre-eminence (but more likely yet another desperate last-ditch effort to defeat Allied bombers while expending a minimum of strategic materials), Messerschmitt, under the direction of Dr. Alexander Lippisch, a noted prewar glider pioneer, embarked as early as 1939 on the development of what would be one of the most remarkable weapons of the war: the Me.-163 series of rocket-powered fighters.

The tiny, tailless delta-winged airplane (built partly of wood) reached speeds as high as 623 mph on air-launched test flights during the summer of 1941. Much of the development was carried out by pilots and engineers who had "earned their wings" during the extensive period of glider development in Germany between the wars—and with good reason: with a maximum powered endurance of only seven minutes, the Me.–163 would invariably return to its base as a glider, landing on a retractable wooden skid. (Takeoffs were made using a wheeled dolly, which was dropped as soon as the Komet became airborne.)

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As with a number of Germany's "Wonder Weapons," the idea may have been excellent, but its execution proved problematic. With no way to "loiter" aloft, the rocket fighter could not be launched until Allied bombers were almost overhead. Then, the closing speed of almost 800 mph allowed for only a three-second burst from the pair of slow-firing 30mm MK 108 cannon in the wing roots before the fighter had flown completely past its targets. Physical demands on the crews were horrific. Special training was required to withstand the climb from near sea level to almost 40,000 feet—in an unpressurized cockpit. A number of pilots died on the ground during training in pressure chambers.

Assuming that the pilot survived the climb, engagement with the enemy, and managed to glide back to a suitable airfield, the worst was often yet to come. The two chemicals which fueled the 3750-lb thrust Walter HWK 509A-2 rocket motor ("T-Stoff," which was primarily monomethyl hydrazine with hydrocarbon stabilizers, and "C-Stoff," almost pure hydrogen peroxide), were intended to explode on contact, and any leaks, or even a rough landing, often resulted in the entire craft disappearing in a fireball. With landing approach speed of nearly 200 mph and only a skid to land on, rough landings were the rule, rather than the exception. Even if the Komet didn't explode, any spills of the extremely reactive C-stoff could literally dissolve a man's flesh from his bones. None the less, by the time the project was abandoned in February 1945 nearly 400 Komets had been built.

Ultimately, while it pioneered research at the leading edge of aerodynamics (and may have contributed to the United States' postwar ascendancy in high-speed aerodynamics and space flight on the basis that "our Germans were better than their Germans"), the Me.-163 was virtually useless for the Axis war effort. Indeed, if it could be considered an effective weapon at all, it would have to be for the Allies, in that it diverted (and, in all too many cases, killed) gifted pilots and engineers who might have been able to contribute much more to other, more viable, projects.



Do 217: A larger, better-armed, and faster development of the Do-17, the Do-217 fast bomber also provide very effective as a night fighter. It was equipped with the FuG-212 BC Lichtenstein airborne radar.



Ju-88: Quite possibly the most valuable and versatile aircraft operated by the Luftwaffe, the Ju-88 operated in bomber, dive bomber, and reconnaissance roles in addition to the radar-guided night fighter task in which it appears in ***Bombing the Reich***. Bristling with weapons as well as the antennas for its Lichtenstein air interception radar, it exacted a heavy toll from British bomber formations.



FW-190 / Ta.-152: The Focke-Wulf Fw-190 and its descendant, the Ta.-152, were certainly Germany's best single-engine fighters; indeed, had the Ta.-152 been developed to its full potential, it might well have become the best single-engine fighter on either side.

The original proposal submitted by designer Kurt Tank covered two versions of the airplane, one powered by the inline Daimler-Benz DB-601 (as in the Me.-109) and the other by the new air-cooled BMW 139. The radial-engine version was selected and first flew on 1 June 1939. A larger engine was then selected, as well as a longer wingspan which cost about 10 mph of top speed but provided greatly increased maneuverability and climb performance.

The first operational unit to receive production airplanes was 6./JG 26, stationed at Le Bourget (Paris). Initial engagements against the RAF in August and September 1941 showed the machine to be clearly superior to the Spitfire V and marked the beginning of a production history that would run through dozens of variants and a total count of some 20,000 airplanes.

Pilots found the airplane a delight to fly. In addition to a sliding bubble canopy which provided visibility far superior to that of the Me.-109, the FW-190 had much wider main landing gear (retracting inward instead of outward), providing vastly easier ground handling. The cockpit was also much more modern, featuring single-lever power control (rather than separate throttle, propeller pitch, and fuel mixture levers), making engine management in combat much easier and less distracting.

Numerous variants took the series through the Fw-190A versions. The basic airframe was extremely versatile, and appeared in day and night fighter, reconnaissance, and ground attack versions. After limited experimentation with an FW-190B series (only three airplanes), a small number of high-altitude FW-190Cs were built with inline DB-603 engines and Hirth turbochargers in a large ventral fairing a` la P-51. (Luftwaffe pilots nicknamed this version "Kanguruh.")

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This program provided the impetus for, and was discontinued in favor of, the FW-190D "Long-nose" or "Dora 190," which used an inline 1776-hp Jumo 213-A engine. (Water/methanol injection could increase its power to 2240 hp for short periods.) In addition to its two 20mm cannon and two heavy machine guns, the basic "Dora" could carry either a 200-Kg. bomb or a 300-liter drop tank under each wing.

Further development of the FW-190D was once again entrusted to Dr. Tank, resulting in the Jumo-engined Ta.-152 (the companion Ta.-153 series, which was held back from production so as not to disturb existing FW-190D construction, differed primarily in having the DB-603 engine instead). Several variants were developed, including a high-altitude fighter with an extended wing and pressurized cockpit. First production Ta.-152s went to JG301 and were used primarily in defense of bases for the Me.-262 jet fighter (q.v.), which was vulnerable during takeoff and landing. With a 30mm and two 20mm cannon, they were formidable opponents.



Me-110: Originally envisioned as a heavy fighter ("Zerstörer"—"destroyer"), Me-110s (more properly, Bf.-110s) were tasked during the Battle of Britain with long-range protection of bomber streams. Unfortunately, while they were reasonably fast, their limited maneuverability and wide turning circle made them easy prey for RAF Hurricanes and Spitfires, and losses were heavy.

Revenge, however, was not long in coming. Recalled to Hitler's "Festung Europa" ("Fortress Europe"), the –110s became some of the Luftwaffe's first night fighters. Initially, they carried no special equipment, relying on their crews' sharp eyes to spot Allied bombers. Later, they were guided by German ground controllers and later still, they were equipped with airborne intercept radar of their own. Their efficiency was diminished by the Allies' development of radar-jamming "Window" foil strips (nowadays called "chaff"), but by early 1944 new radar had been developed to counter the threat. At this time, the German night-fighter force was at the peak of its capability; some 300-odd Bf.-110s were deployed, representing about 60% of the German night-fighter inventory.



Do-335: Had Dornier's model 335 "Pfeil" ("Arrow") been developed earlier in the war, it might have been a formidable opponent: a heavy single-seat twin-engine fighter with excellent performance and even better handling, the latter due to its arrangement of engines in nose and tail instead of on the wings. It also had tricycle landing gear and one of the first ejection seats in the world, offering the pilot a chance to clear the rear propeller in case of a bailout.

Various versions were planned including a two-seat night fighter and a long-range four-engine fast reconnaissance plane built by joining two Arrows with a new wing center section. Some 40 of the base version were built. A few found their way into combat with an operational test unit in the spring of 1945.



He-219: It was fortunate for the Allies, and unfortunate for the Luftwaffe, that development of the Heinkel HE-219 "Uhu" (owl) was mired in politics and misjudgements. Certainly the most technically sophisticated, and potentially the best night fighter of the War for either side, it was also one of the few Axis night fighters that had a chance at bringing down the de Havilland Mosquito.

Among its features were the first ejection seats to be used on an operational aircraft and tail warning radar to alert its crew to the presence of a pursuing night fighter. Many carried the notorious "Schräge Musik" (literally, "crooked music," a contemporary German expression for jazz) installation, a pair of fuselage-mounted 30mm cannon firing upward at a 45-degree angle. Using these, an Uhu could be vectored in below an unsuspecting bomber stream, then blast heavy cannon fire into the Allied ships' relatively unprotected bellies. On his first sortie in a preproduction Uhu in June 1943, Major Werner Streib brought down five Lancasters, and his unit shot down 20 RAF airplanes, including six Mosquitos, during its first six operational sorties.



Reggiane Re. 2001: Developed from the stubby radial-engined Re. 2000 (which looked a bit like a shrunken early P-47), Italy's Reggiane Re. 2001 was designed to be refitted with the same Daimler-Benz DB-601 that powered the Messerschmitt Bf.-109. Since the Luftwaffe had priorities on this engine, it was built under license by Alfa Romeo as the RA. 1000. These, too, were in short supply; ultimately, only some 250 Re. 2001s would see service. They were heavily armed for their size, with three 20mm cannons and two heavy machine-guns. A developed version, the Re.2005, saw heavy use in Sicily at the end of the war; a few even retreated into Germany and participated in the last unsuccessful defense of Berlin.



Dewoitine D. 520: This elegant little fighter, powered by a 935-hp Hispano-Suiza engine, was clearly the best aircraft available to the Armée de l'Air at the time of World War II. By the time the last prototype had flown, some five months before Germany's invasion of Poland, Dewoitine had already received orders for 200 of them; two months later, another 500 were ordered.

The first production airplanes flew in October of 1939, but barely 400 had been delivered by the time France capitulated in 1940. The Vichy government continued production until all of France was occupied, building another 75 or so. While the Luftwaffe never adopted the type for combat, they were used as fighter trainers as well as distributed to Germany's allies including Italy, Romania, and Bulgaria.



FIAT G.50bis: Developed from the G.50, which had flown briefly in the Spanish Civil War and then against the Allies in southern France and in the Low Countries in 1940, the G.50bis featured increased fuel tankage (the G.50s limited range had made it almost useless for many operations) and an improved cockpit enclosure. Most G.50bis served in North Africa, but some were active (until the Italian armistice in September, 1943) in Sardinia, Greece, and the Aegean Sea.



FIAT G.55: Based only loosely on the G.50 and intended to correct many of its shortcomings, the G.55 was so late going into production that only 31 were delivered before the Italian Armistice. These served in the Italian defense of Rome. Until the capture of the factories in northern Italy, the airplane continued in production and was flown by the Fascist air force alongside the Luftwaffe. Ultimately almost 300 were built before the end of the War. Many were damaged on the ground by Allied air attacks. A single prototype G.56, equipped with a DB-603 engine, was the fastest Italian fighter of the war.



Macchi M.C. 200: A relatively light and low-powered fighter, the M.C. 200 was first flown on Christmas Eve, 1937. First production deliveries came in October 1939 and by the time Italy became involved in WWII there were 150 on hand (out of what would be a total production run of about 1500). Initial operational use was against the island of Malta, with subsequent service in Greece and Yugoslavia. When Italy fell, 23 defecting pilots flew their M.C. 200s to Allied airfields in the south of the country, where they were flown by the Italian Co-Belligerent Air Force.



Macchi M.C. 205: An improved version of the M.C. 200, the M.C. 202 "Folgore" (Thunderbolt) was developed in 1940. This, in turn, led to the M.C. 205 "Veltro," (Greyhound), basically an M.C. 202 airframe with a 1475-hp Daimler-BenzDB-605 engine (later replaced with a FIAT "Tifone" of the same power). The Veltro was considered the best Italian fighter of World War II, and could meet the P-51 on virtually equal terms. A total of 262 were built; of the 66 in service when Italy surrendered, six flew to Allied basis and were used by the Italian Co-Belligerent Air Force. A small number were used to equip one Luftwaffe fighter Gruppe.

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Me.-210/Me.-410: Even before the Me.110 (q.v.) had shown its weaknesses during the Battle of Britain, Messerschmitt had been tasked with designing its successor. The initial result, the Me.-210, introduced improved rear-firing armament in the form of a pair of 13mm machine guns in remote-controlled barbettes on the fuselage sides. Unfortunately, the airplane as a whole proved unstable and difficult to handle. Despite later modifications that attempted to solve the problem, production was halted in April 1942 after about 200 units and factory facilities returned to building Bf.-110s.

Unwilling to abandon the project, Messerschmitt made major modifications including automatic leading-edge slats a` la Bf.-109 and a redesigned and lengthened aft fuselage. Equipped with 1750-hp DB-603A engines, the airplane was re-designated Me.-410 and manufactured at high production rates by both Messerschmitt and Dornier.

Although most Me.-410 units found themselves tasked with the defense of the Reich in 1944, some were used in both day and night fighter-bomber attacks on southern England. Here, however, they weren't much more effective than the earlier Bf.-110s, and production was terminated in September, 1944, after 1160 of them had been built.



Me.-262A: July, 1944: On both sides of the English channel, the world's first jet fighters are about to enter operational service. England, now essentially recovered from the Battle of Britain and with not only its own, but the United States' massive scientific and industrial base to rely on, fields the Gloster Meteor. Germany, with its industry and economy virtually destroyed and its population reeling from "round the clock" bombing, launches the swept-wing Messerschmitt Me.-262—an airplane over 100 mph faster than the Meteor Mk. I. Had it not been for a combination of high-rank bungling and difficulties in engine development, the Me.-262 "Schwalbe"—"Swallow"—might have entered squadrons sooner, and the air war in Europe might have been decided very differently.

Historical Overview

Design of the airplane began in late 1938, with the first prototype lifting off under pure jet power on 18 July 1942 (the airframe had flown earlier, first with a Jumo 210 piston engine in the nose to check out its aerodynamics, then with underwing jets in addition to the prop). Engine difficulties slowed development—but an equally important factor was the insistence of Adolf Hitler (over the agonized objections General Adolf Galland) that the airplane be modified for the ground-attack role as well. The diversion of effort to the "Sturmvogel" (Storm Bird) attack airplane delayed the introduction of the pure-fighter Swallow version until July 1944.

Had it come earlier, its effect on the Allied day bombing campaign would have been devastating. Flying at over 500 mph, it could have decimated whole formations with its 24 R4M unguided rockets before closing in to attack fighters and finish off damaged bombers with its four 30-mm cannon. As it was, although almost 1500 jets were built, it was "too little, too late." With the Allies ashore in France and the German war machine starting to collapse, the few operational 262 squadrons were hard put to maintain combat readiness. A poignant picture from the time shows a replacement jet engine being brought to this, the most advanced fighter in the world...on a horse-drawn cart.

In all fairness, and despite its astonishing high-speed performance, the Me.-262 was far from invincible. In fact, at high speed, its large turning radius made it difficult to make repeated runs against a bomber formation. The most workable technique was a single, slashing attack followed by disengagement. Given the low thrust of its jet engines (1984 lbs each) compared to modern jets, and the fact that jets are more efficient at high speeds, less so at lower speeds, attempting a tight turn at high speed could "bog down" the airplane. It then required some time to accelerate again, during which time it was vulnerable to Allied fighters. Moreover, while relatively efficient at very high altitudes, the jets' fuel consumption increased astronomically down low, and below about 20,000 feet the Me.-262's radius of action was drastically reduced.

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The Me.-262 was probably at its most vulnerable taking off and landing. Jet engines depend on speed for efficiency, with 1 lb of thrust becoming equivalent to 1 hp at about 375 mph. Thus, while the Me.-262 had the equivalent of over 3000 hp at attack speeds, it was under-powered on takeoff, and during the time it was rolling on the (necessarily long) runway, lifting off, getting its landing gear and flaps up, and accelerating toward an efficient climb speed, it was easy prey for Allied fighters. Similarly, early-generation jet engines responded only very slowly to throttle inputs (and were likely to burn themselves out if the pilot moved the throttle too fast). An Me.-262 on final approach was essentially committed to land, and it took agonizingly long moments to break off an approach, get the engines "spooled up," and try to evade if pounced on by an Allied fighter. It was for this reason that many Me.-262 bases had additional squadrons of prop-driven fighters such as Ta.-152s (q.v.) on hand specifically to defend the precious and vulnerable jets during takeoff and landing.

GROUND DEFENSES

The German Fligerabweherkanone, mercifully shortened to Flak, was anything but merciful. By the end of the war, half of American combat losses in the air were due to ground fire. To be sure, this is a testament to how important Flak became after air superiority was wrested from the Luftwaffe in 1944. Over two thirds of the bombs dropped on Germany were dropped in the last year of the war. Flak had a disturbing impact on the bomber crews who had to lumber through it, level and smooth, in order to drop their bombs. The British aircrews that flew at night did so at much lower altitudes, making Flak even fiercer for them.

The most common and most feared weapon was the "Eighty-Eight." This 88-mm cannon was fired with terrific accuracy and one burst, even within 30 feet of an aircraft, could knock it down. Seventy percent of all heavy cannons were Eighty-Eights. However, its optimum range was just above 20,000. Most of the American bombers flew from 23,000 to 25,000 feet. Hence, the arsenal of 105 and 128 mm guns was added to German ground defenses.

Historical Overview

A post-war study war determined that 40 percent of radial bombing errors made by American bombers were due to nerves, reduced efficiency, and unauthorized evasive action resulting from heavy Flak over the target area. At 10,000 feet bombers dropped 26 percent of their bombs within 500 feet of the target. At 26,000 feet, that number dropped to six percent. But the higher altitude was often chosen to stay out of range of the Eighty-Eight. Flak was just too unnerving. You couldn't fire back. You couldn't evade. You just had to hope your time over it and through it was as short as possible.

At lower altitudes the small arms weapons were worse. When the British and American fighters took to flying low over the countryside, picking up targets of opportunity, and as they began supporting the ground offensive in 1944, Flak casualties began to rise. The trick was always to surprise a target, like an airfield, by flying down on the deck. The first plane in to make its attack was usually safe. But you didn't want to be the last one in, because the anti-aircraft fire would zero in on that "tail end Charlie". It was rare that a fighter-bomber ever turned back to attack their target twice—the ground fire was too keyed up by then. They attacked and moved on quickly.

Earlier in the war, Barrage Balloons were much more effective against dive-bombing manuevers attacking stationary targets. The Luftwaffe employed few of them. Tethered to the ground by giant cables stretched upward to 4,000 feet they proved an obstacle to any dive-bomber coming down its path.

At its peak in 1944 the German Flak divisions employed 900,000 men and women, with 14,250 heavy guns, 34,750 light and medium guns, 1,500 barrage balloons, and 6,750 heavy searchlights. They made their presence felt even when the Luftwaffe could no longer command the skies.

Fighters/Fighter Bombers: Combat

Aircraft Type	Radius	Speed	Cruise	Ceiling	Climb	MVR	Dur	Armor	End	Gun Val	Load
Mustang I	495	390	270	32000	1852	32	32	1	250	20	0
Spitfire Vb	208	374	272	35500	2666	34	28	1	105	16	500
Spitfire IX	437	408	324	43000	2800	37	28	1	180	16	1000

Fighters/Fighter Bombers: Combat

Aircraft Type	Radius	Speed	Cruise	Ceiling	Climb	MVR	Dur	Armor	End	Gun Val	Load
Mustang I	495	390	270	32000	1852	32	32	1	250	20	0
Spitfire Vb	208	374	272	35500	2666	34	28	1	105	16	500
Spitfire IX	437	408	324	43000	2800	37	28	1	180	16	1000
Spitfire XIV	493	408	362	4300	3000	39	28	1	180	14	1000
P-39D Airacobra	256	368	213	32100	2632	29	32	1	170	18	500
P-40E Kittyhawk	330	364	290	31000	2083	31	29	1	155	18	700
P-38G Lightning	333	391	300	39000	2353	32	37	1	290	16	2000
P-38J Lightning	440	414	290	44000	3143	34	39	1	345	16	3200
P-47C Thunderbolt	337	412	335	42000	2240	34	35	1	170	24	1500
P-47D Thunderbolt	446	428	350	42000	2000	36	36	1	205	24	2000
P-51B Mustang	604	419	362	41800	3300	36	32	1	290	12	1000
P-51D Mustang	667	437	380	41900	3400	37	32	1	330	18	1500
Mosquito F.B. IV	709	380	255	33000	2850	33	36	0	380	24	2000
Hurricane II	183	320	235	33000	2300	31	29	2	110	16	1000
Typhoon IB	245	412	280	35200	2500	32	36	2	120	16	2000
Tempest V	764	426	310	36500	3000	34	36	2	330	16	2000
A-36A Apache	495	390	270	32000	1852	32	32	2	250	18	1000

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Medium Bombers: Combat

Aircraft Type	Radius	Speed	Cruise	Ceiling	Climb	MVR	Dur	Armor	End	Gun Val	Load
Mosquito B IV	772/976	380	275	34000	2600	26	36	0	380	0	2000
A-20B Boston	489/695	350	278	28600	1500	17	35	1	240	13	2000
A-20G Havoc	498/1103	342	272	25800	1800	16	36	1	250	31	4000
A-26B Invader	688/1520	355	280	31300	1235	20	42	1	335	30	6000
B-25D Mitchell	744/1082	300	233	21200	1100	14	42	1	445	18	3000
B-25J Mitchell	738/1071	275	230	23800	789	13	44	1	365	33	4000
B-26B Marauder	564/864	310	210	23500	1250	16	42	1	380	33	3000
B-26G Marauder	509/933	280	200	19800	1000	18	44	1	365	33	4000
Baltimore V	459/625	320	230	24000	1200	12	44	1	280	16	2000
Wellington III	763/1187	250	215	19000	1120	12	43	1	500	16	4500
Wellington X	763/1187	260	215	19000	1200	12	44	1	500	16	4500

Heavy Bombers

Aircraft Type	Radius	Speed	Cruise	Alt	Climb	MVR	Dur	Armor	End	Gun Val	Load
B-17F Flying Fortress	815/ 1515	317	180	35000	600	4	68	1	660	26	6800
B-17G Flying Fortress	815/ 1515	287	180	31500	600	4	69	1	660	36	6800
B-24D Liberator	790/ 1801	303	190	32000	909	3	60	1	600	30	8800
B-24J Liberator	790/ 1801	290	190	28000	900	3	61	1	600	30	8800
B-29 Superfortress	843/ 4481	358	260	31850	526	3	70	1	450	30	20000
Stirling I	311/1475	270	205	13500	800	2	47	1	220	16	14000
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

B-25J Mitchell	738/1071	275	230	23800	789	13	44	1	365	33	4000
B-26B Marauder	564/864	310	210	23500	1250	16	42	1	380	33	3000
B-26G Marauder	509/933	280	200	19800	1000	18	44	1	365	33	4000
Baltimore V	459/625	320	230	24000	1200	12	44	1	280	16	2000
Wellington III	763/1187	250	215	19000	1120	12	43	1	500	16	4500
Wellington X	763/1187	260	215	19000	1200	12	44	1	500	16	4500

Heavy Bombers

Aircraft Type	Radius	Speed	Cruise	Alt	Climb	MVR	Dur	Armor	End	Gun Val	Load
B-17F Flying Fortress	815/ 1515	317	180	35000	600	4	68	1	660	26	6800
B-17G Flying Fortress	815/ 1515	287	180	31500	600	4	69	1	660	36	6800
B-24D Liberator	790/ 1801	303	190	32000	909	3	60	1	600	30	8800
B-24J Liberator	790/ 1801	290	190	28000	900	3	61	1	600	30	8800
B-29 Superfortress	843/ 4481	358	260	31850	526	3	70	1	450	30	20000
Stirling I	311/1475	270	205	13500	800	2	47	1	220	16	14000
Stirling III	312/1476	275	205	15000	850	2	48	1	220	16	14000
Halifax II	542/1214	270	200	20000	750	4	49	1	390	17	11000
Halifax III	623/1624	312	215	18600	960	4	49	1	410	17	13000
Lancaster I	813/2163	287	210	19000	600	7	51	1	550	16	14000
Lancaster III	588/2538	287	210	19000	600	6	51	1	400	16	18000

Night Fighters

Aircraft Type	Radius	Speed	Cruise	Alt	Climb	MVR	Dur	Armor	End	Gun Val	Radar
Beaufighter IF	661	306	230	30000	1850	25	38	1	400	28	Yes
Beaufighter V IF	625	310	240	26500	1850	27	38	1	360	28	Yes
Mosquito NF II	834	370	295	33500	2700	31	36	0	380	24	Yes
Mosquito NF XIII	941	410	300	34500	2700	32	36	0	420	16	Y+Rad Det.
P-61A Black Widow	1311	366	250	33100	1666	33	41	1	720	28	Yes

Recon Aircraft

Aircraft Type	Radius	Speed	Cruise	Ceiling	Climb	MVR	Dur	Armor	End	Gun Val	Load
Spitfire IV	528	376	275	38000	4800	37	28	1	260	0	0
Spitfire XI	647	410	330	44000	4000	38	30	1	360	0	0
Spitfire FR XIV	421	440	370	44000	4600	39	31	1	200	14	1000
Mosquito PR XVI	1314	408	250	38000	2900	31	36	0	720	0	0
F-5A Lightning	484	400	310	40000	2353	32	37	1	350	0	2000
F-5C Lightning	637	420	300	45000	3143	34	39	1	425	0	3200
F-6A Mustang	495	390	270	32000	1852	32	32	1	250	20	0
F-6D Mustang	667	437	380	41900	3400	37	32	1	330	18	1500

Elec Warfare Aircraft

Aircraft Type	Radius	Speed	Cruise	Alt	Climb	MVR	Dur	Armor	End	Gun Val	EW Device
Fortress RCM (Jammer)	815	287	180	35600	600	4	69	1	660	36	*Jostle*
Liberator RCM (Jammer)	790	290	190	28000	900	3	61	1	600	30	*Jostle*
Stirling RCM (Jammer)	718	270	205	16500	800	2	47	1	500	16	*Mandrel*
Halifax RCM (Jammer)	542	270	200	22000	750	4	49	1	390	17	*Mandrel*
Mosquito RCM (ELINT)	677	380	245	30600	2600	26	36	0	380	0	*Elint Receiver*
Wellington RCM (ELINT)	639	250	185	19000	1120	12	43	1	500	16	*Elint Receiver*

Executive Producer: . . .

Director of Developme

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Production Aide: . . . .

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Art Director: . . . . . .

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Music Arrangement: . .

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Player's Guide: . . .Ro

Manual Editing: . . . . .

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Historical Documenta

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Bud Morgan, D

Elec Warfare Aircraft

Aircraft Type	Radius	Speed	Cruise	Alt	Climb	MVR	Dur	Armor	End	Gun Val	EW Device
Fortress RCM (Jammer)	*815*	*287*	*180*	*35600*	*600*	*4*	*69*	*1*	*660*	*36*	*Jostle*
Liberator RCM (Jammer)	*790*	*290*	*190*	*28000*	*900*	*3*	*61*	*1*	*600*	*30*	*Jostle*
Stirling RCM (Jammer)	*718*	*270*	*205*	*16500*	*800*	*2*	*47*	*1*	*500*	*16*	*Mandrel*
Halifax RCM (Jammer)	*542*	*270*	*200*	*22000*	*750*	*4*	*49*	*1*	*390*	*17*	*Mandrel*
Mosquito RCM (ELINT)	*677*	*380*	*245*	*30600*	*2600*	*26*	*36*	*0*	*380*	*0*	*Elint Receiver*
Wellington RCM (ELINT)	*639*	*250*	*185*	*19000*	*1120*	*12*	*43*	*1*	*500*	*16*	*Elint Receiver*

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